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796 The series of processions, with their two singers and four songs, was varied four times during the day. At dawn the procession came without singing, carrying out the banners of Sun and Moon. In the afternoon, similarly, they "brought out the clouds," a square banner with the conventional cloud representation. If rain had not put a stop to the proceedings, a tall pole was to have been brought out tipped with feathers to draw down rain and ultimately a bowl of food to bring plenty.

796 Toward the middle of the afternoon, when the cloud procession was in full swing, two clowns appeared. They wore no special costume but the white deerskin mask described for the other performers, and each carried a bow and arrow. They approached up to the humble shelter and addressed the keeper of the smoke.

"We are hungry (plural for dualers), we are going smoking."
The keeper replied:
"Eat in! Plenty meat (venison) over there."
"We are going to eat the deer meat."
"Plenty meat."

They approached above the plaza and went through a performance of looking for meat, hiding behind bushes, and shooting the air, all the time talking to each other in squeaky voices. The spectators enjoyed it immensely. Then they imitated drinking from a spring, trying to duck each other and give each other a bath. Informants said that the clown performance differs every year, according to what the men think up. There are sometimes more than two clowns, but news had gone around that this ceremony would be very poor because only two could be found.

796 The feast ground was surrounded during the whole day with families who camped there, bringing their food. The volunteer performers were not subject to dietetic restrictions like the scraping-stick musicians and the corn-meal sprinklers. They might eat anything they pleased if it did not contain salt. The tradition is that the women of Quinvaca should bring large quantities of saltless food to the feast ground so that the visitors might eat. If anyone choked or bit on a piece of grit while eating, he must go to the scraping-stick musicians and let them sing over him to cure him.

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on them and their families a disease called yellow vomit. The writer has not identified this disease, but has found it frequently mentioned by old Spanish writers as a pest of the country. The Papago say: "It comes from the smell of the ocean or the smell of the Apache. The Whites don't know that: that's why they have it so much."(9)

The length of the period of seclusion varied. At Komarik it was one month the first time, then four days.(9) At Akchin, eight days the first time, then four.(6) At Piñimmo it was sixteen days, with a move nearer the house after every four.(1) At Anegam it was four days away from the house, with diet restrictions for four days after the return.(5)

In any case, after each four-day period the neophyte was bathed by his guardian in cool water. His face was not washed at the purification after war, but otherwise he was under the same restrictions. He was not allowed to eat meat, salt, or grease. He must [illegible] eat at the end of an hour. For the first four days and nights, after the purification, he was allowed no food at all; afterward he could have a small ball, like the meat ball, but [illegible] four days he drank no cool water, only [illegible] [illegible] by sucking a stick in the morning, and was given more privately by the women of the family. The woman cooked for him, but on a separate fire, at a separate part of the fire, where none of the family food had been cooked. He must use the scratching stick—according to some, the same which he had brought from the ocean, according to others, a new one every four days. His wife was under no restrictions.[7]

Neophytes generally made their first pilgrimage at sixteen or seventeen, and this experience placed them within the ranks of adults. The seclusion during purification was the time when the fathers of eligible girls often approached the parents of neophytes to offer their daughters.

[7] This pilgrimage has obvious likenesses to the simpler ones made by Zuñi (Stevenson, 1904–5, pp. 334–36; Acoma (White, 1929–30, p. 199); Laguna (Parsons, 1923, p. 208); Cochiti (Goldfrank, p. 9); and Hopi (Beaglehole, "Notes on Hopi Economic Life," Yale University Publications in Anthropology, No. 15, pp. 50–55). It also has many points in common with the Huichol expedition to gather *hikuli* or peyote (Lumholtz, 1900, pp. 196–236 and 285–380).

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In the southern part of the reservation the dance lasted four nights(29); in the northern part, a whole month. It was given wherever the family happened to be, either in camp or in a permanent village. "We used to have good times in cactus camp," one informant said, "because somebody would be sure to reach puberty, and then we would dance all the time."(26)

The length of the time of dancing depended on the wealth of the girl's parents, since they must give a meal to the dancers every night. Poor people might omit the dance entirely, trusting to purification by the shaman to relieve the girl from danger. People who were well supplied sent word to neighboring villages and camps as soon as the girl's four-day seclusion was over, and crowds arrived every night to join in the gaiety.

There were several men in any village who knew the appropriate songs. These they might have dreamed during some period of puberty, or they might have learned them from others. The song leader for the house was a prominent one, since the leader himself was in the maiden. He and other men dancers usually ate any extra meal at midnight. Each participant in the dance came from the house provided by the parents of the pubescent girl from the previous evening, because they stayed up all night dancing. If the dance lasted a month, she generally, when it ended, had disposed of all her clothes and ornaments except what she wore.

In this dance men and women stood side by side in two lines which faced each other. They placed their arms over each other's shoulders and pulled their blankets across in front of them to make an unbroken covering for the whole line. This was the only dance where such close contact was permitted.

At the end of one line danced the song leader, with the maiden at his left and the rattle in his right hand. His wife danced opposite. The lines walked back and forth toward each other singing, for there was no chair on this occasion. After each four songs they rested, though the girl herself was not supposed to sit down. Her family provided a nonintoxicating drink of cactus juice or some brew of berries and fruit. For the meal at midnight they might kill a deer or provide a stew of rabbits, beans, and corn.

If the dance lasted a month, more than one song leader had to

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ECONOMICS

Poor as the Papago country was, its economics were those of abundance. Papago did not hoard property; they did not quarrel about land boundaries; they were constantly giving, as though from an inexhaustible supply. The answer is that the supply, meagre though it was from the modern point of view, was sufficient, for their simple needs and more.

Food was the principal gift and food will not keep in that hot country except in dehydrated form. Because of the migratory life, it must be left unguarded in storehouses and caches, subject to attack by animals or enemies. Better to dispose of any surplus while it was available and palatable and thus invest in good will. And anything not destroyed returns and overstocks a surplus. The standard meal was very good; visitors much beyond that were honored with extra food and were missed.

Giving became the center of economic interest and the hardest working man, by using himself and accumulating property, found himself in the position of a banker. He was a generous boy, but the fact gained the experience to emphasize and increase the property of others and thereby his own. While his parents gave out only material things and food, a continuous service poured in. His old gifts were returned, in equal quantity and more. The constant exchange of goods in the form of gifts was the Papago equivalent for trade and merged only occasionally into trade in the stricter sense. Papago economics involves principally the study of groups which had gift relations.

The center of the system was the patriarchal family which, rather than the individual, must be taken as the unit both of property holding and of gift exchange. The family was a business concern, producing and disposing of goods under the direction of its male and female heads, and such production meant a full time occupation. This was not the sort of society where the men, when not hunting or fighting, had the privilege of leisure: the men were day laborers like the women. All rose with the morning star, rested in the heat of noon and did not stop work until dark. It was slow motion labor, for the heat forbids haste. But it was unremitting. Industry was the prime virtue and no one could get a mate or keep one without it.

We have noted the division of labor between male and female; a division so sharp that it kept the two sexes in separate groups during

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Then the girls put the nets on their backs and if one was married and had a baby, she put that on top in its cradle board. Some men went with them with their war arrows because there were Apaches in the land then. They all went running, running. If they saw dust in the distance that they thought was Apaches, they went dodging behind the giant cactus. You see, women had to run in those days. That was what saved their lives. Many hours they had to run, and when they came back every family had two little jars of water to last for the day. But we did not mind. We knew how to use water. We have a word that means thirst-enduring and that is what we were taught to be. Why, our men, when they went off hunting, never drank at all. They thought it was womanish to carry water with them.

My brothers went running off, too. Ah, how we could run, we Desert people; all the morning until the sun was high, without once stopping! My brothers took their bows and arrows and went far off over the flat land.

"Run," my father said to them. "Run until you are exhausted. So you will be a strong man. If you fall down tired, far out in the waste land, perhaps a vision will come to you. Perhaps a hawk will visit you and teach you to be swift. Perhaps you will get a piece of the rainbow to carry on your shoulder so that no one can get near to you, any more than to the rainbow itself. Or maybe Coyote himself will sing you a song that has magic in it."

So they went off in their breechclouts and bare feet, running in the dark when they could hardly see the cactus joints on the ground and the horned toads—rattlesnakes there were not in that cool weather. One of my brothers did really have visions. The others used to come back without him, bringing jackrabbits for our dinner. The little boy would come in much later and never tell where he had been. But we found out long, long after, when he became a medicine man, that he had been lying dead out on the desert all those hours and that Coyote had come and talked to him.

When they were gone my mother would come crawling out. She went to the little enclosure beside our house, made of greasewood bushes piled in a circle and she got the pot of gruel. We always kept gruel in our house. It was in a big clay pot that my mother had made. She ground up seeds into flour. Not wheat flour—we had no wheat. But all the wild seeds, the good pigweed and the wild grasses. And corn, too! Some summers we could grow corn. All those things my mother kept in beautiful jars in our storehouse. Every day she ground some more and added fresh flour to the gruel and some boiling water. That pot stood always ready so that whoever came in from running could have some. Oh, good that gruel was! I have

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never tasted anything like it. Wheat flour makes me sick! I think it has no strength. But when I am weak, when I am tired, my grandchildren make me gruel out of the wild seeds. That is *food*.

I used to help my mother. When I was very little I began to grind the seeds, just for a short time. When I was ten years old I did it all, for then a daughter should be able to take over the work and let her mother sit down to baskets. But I am telling you about the early days when I could only grind a little. Then we pulled the grinding slab inside the house by the fire and my mother knelt behind it. I picked the dirt out of the seeds and handed them to her, and the pot boiled on the hearth on the three stones that we kept there.

My father was very busy, for he was the chief of our village. People used to bring their quarrels to him, and I remember him sitting crosslegged under the arbor we had to keep off the sun, listening with his head bent and his arms folded, while people talked.

"My daughter disappeared with a man on the last night of the maiden's dance. I want her beaten." "How many stripes?" "Twenty." "Fifteen," said my father. He was a gay man who liked to war and to gamble. He did not like to beat women.

Some days nobody would come, and then he would gamble with the other men, throwing the sticks that we use for dice, and then moving stones around a circle as many moves as there were marks on the stick. We used to hear the men singing in a low tone, before they threw, to give them luck:

Down I shall throw
The smooth stone I shall move
Move it to the corner.

They smoked, too, and I can smell their tobacco yet, the strong wild tobacco that we do not have any more. It was tied in a long corn husk, so white, so nice, and when one man passed it to another he said: "Friend!" And the other said, "Friend."

When the sun was high, high, my brothers and my sister came home, and as each one came my mother gave them food. She dipped the gruel out of the pot into a bowl, for my mother was a good potter. We all had bowls in our house. Only my father and my mother ate out of the same one laughing together, because they liked each other. When my mother dipped out our food she said: "Do not eat it hot. You will have wrinkles." She set mine on the grinding slab to cool. "It will make you industrious," my mother said. My father said to the boys: "Do not eat it hot, no matter

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how hungry you are. Wait till it has scum on it. So you will be a runner and not a fat man." 159x 264

When we had finished we did not wash the dishes. How could we, with no water! We scooped food out with our knuckles. The boys used two knuckles because men have time to eat. We girls used three because women must hurry and work. When we were through it was only my father who could wipe his fingers between his toes. That was because he was a warrior and had killed enemies. The rest of us wiped them on the ground and rubbed our hands together. I do not like water on my dishes even now. They feel so smooth. [701]

Then we made our toilet. We washed our faces in a little cold water, but we did not bathe. Rubbing yourself with earth does just as well. Then the older girls painted themselves with beautiful red paint, all in dots and splashes. I went out to play. 159x 515 302

I played with the boys and girls who were children of my uncles. Brothers and sisters, we call them. We had no clothes, any of us, but we were not cold. We went to a sunny place and made ourselves dolls of mesquite leaves tied with strings of corn husk for arms and legs and head. We had a little stone for the grinding slab and some sand for the corn. The boys had men dolls and they would take them away and say: "We go hunting." "Well, go," said the wives. Then the boys would hunt all around the village and find a deer bone. "Here is a deer for you." 159x 157 [291] [524]

Sometimes the boys went to get rats. They poked them out of the holes and hit them with sticks. Then we roasted them on sticks with the skins on. Good food, that used to be! [262]

Sometimes we went to run races. We had a good racetrack in our village. Our men had cleared a road that ran across the flat land as far as you could see, and every day they swept it with greasewood branches to keep off the thorns. They had a song: 159x 526 [533]

The hawk made the race-track
And on it we won
A-a-ah!

We ran with the hawk
And won a Hawk's heart
A-a-ah!

All our young men and girls practised on that racetrack so they could run fast against the other villages. We children ran, too. Every day I ran until I was ten years old and had to be doing the house work.

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159 221 But we did not stay at Mesquite Root all the time. We were hungry people, we and my father's brothers and his cousins who lived around us. In those winter days my father went to hunt deer and sometimes we all went with him down over the Mexican border to pick the century plant and roast it or to get stalks for our basketry or clay for our pots.

159 222 All the year round we were watching where the wild things grew so we could pick them. Elder Brother planted those things for us. He told us where they are and how to cook them. You would not know if it had not been Given. You would not know you could eat cactus stems and shake the seeds out of the weeds. Elder Brother did not tell the Whites that. To them [243] he gave peaches and grapes and wheat, but to us he gave the wild seeds and the cactus. Those are the good foods.

There was a kind of cactus called cholla, and when its buds were green [343] we all went and stayed for many days picking them, up in the hills. We pulled the tops of some palo verde trees together and piled greasewood bushes over them to make a shelter and there we lived. My uncles made shelters, too, and my mother and my uncles' wives all went together to pick the cactus. They broke off the new stems with tongs and rolled them around on the ground to get the thorns off, and then baked them all night in a big pit. They smelled fresh and fine when they came out. When the big pit was roasting slowly in the night, the women threw green cholla stems on the campfire ashes to cook. We pulled them out, knocked off the thorns, and ate them hot. Ah, good, good food! We ate nothing else for those three weeks. Green things!

At last the giant cactus grew ripe on all the hills. It made us laugh to see the fruit on top of all the stalks, so many, and the men would point to it and say: "See the liquor growing." We went to pick it, to the same place where we always camped, and every day my mother and all the women went out with baskets. They knocked the fruit down with cactus poles. It fell on the ground and all the red pulp came out. Then I picked it up, and dug it out of the shell with my fingers, and put it in my mother's basket. She told me always to throw down the skins with the red inside uppermost, [82] because that would bring the rain.

159 533 It was good at cactus camp. When my father lay down to sleep at night he would sing songs about the cactus liquor. And we could hear songs in my uncle's camp across the hill. Everybody sang. We felt as if a beautiful thing was coming. Because the rain was coming and the dancing and the songs.

Where on Quijotoa Mountain a cloud stands
There my heart stands with it.

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when my
mother cooked food at the big house, she would come over and pour some in my bowl, but no meat and nothing with salt in it. My father sharpened a little stick for me to scratch my hair with, because if I touched it, it would fall out. I was so afraid to lose my nice long hair that I kept that stick in my mouth all the time. Even when I was asleep, I had it there.

It is a hard time for us girls, such as the men have when they are being purified. Only they give us more to eat, because we are women. And they do not let us sit still and wait for dreams. That is because we are women, too. Women must work.

They chose my father's cousin to take care of me. She was the most industrious women we had, always running with the carrying basket. That old woman would come for me in the dark when morning-stands-up. "Come," she said. "Let's go for water over across the mountain. Let's go for firewood."

So we would run, far, far across the flat land and up the mountain and bring the water back before daylight. I would leave it outside my father's house and not go in. Then that old woman would talk to me.

"Work hard. If you do not work hard now, you will be lazy all your life. Then no one will want to marry you. You will have to take some good for nothing man for a husband. But if you are industrious, we shall find you a good old man."

That is what we call our husbands: old man. But this woman did it out of modesty, too, so that I should not have young men in my mind. "When you have an old man," she said, "you will grind the corn for him and you will always have water there for him to drink. Never let him go without water. Never let him go without food. He will go to the house of some one else to eat and you will be disgraced."

I listened to her. Do you say that some girls might think of other things and not listen? But I wanted to be a good woman! And I have been. Ask anyone in our village if they ever saw me with idle hands. Or legs, either, when I was younger.

All the girls came around the Little House while that woman talked. They did not come near, because that would not be safe, and she would call to them: "Go away." But they sat and listened and when she was tired of talking, they laughed and sang with me. And we played a game with little stones and a ball. We pick up the stones in different ways with one hand while we catch the ball in the other. Oh, we have good times at the Little House, especially when that first month is over. But other women who were dangerous did not come; that would be too much.

I had to stay four days and then I was not dangerous any more. Every-

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"Come out," said my father on that first night. "Now you must dance or the Leg will drag you out. He's mean."

I did not want to dance; I was sleepy and I had run so far. Always when I had heard the others singing those maiden songs, from far away, I had been wild to go. But now it was my turn and all I wanted to do was sleep. But Luis, the Leg, came into the house and took me by the arm. He always danced next to the maiden, with his arm over her shoulders and the rattle in his other hand. He and I were at one end of a long line of people and his wife at the end of a line opposite. There was first a boy and then a girl, all down the line, with their arms over each other's shoulder and the blankets held along at the back. I told you the boys always liked that dance.

The lines went to and fro, toward each other, and they kept wheeling a little, till at last they had made a circle.

On top of Baboquiviri Peak
There is a fire burning.
So near I came.
I saw it blow all over the ground
Shining.

On the flat land
There is a house of clouds.
There stand white butterfly wings (of clouds).
It pleased me. That was what I saw.

Those were the songs they sang, with the rattle going in the night. We had no fire; we kept warm dancing. After every four songs Luis stopped, because his voice was hoarse. Then he let me go, and we girls went and sat together while the men smoked. How dark and cold it was then, with only one ember to light their cigarettes!

There were girls who did not come to sit with us and boys who did not sit with the men. How dark it was! Some mothers went looking for their girls in the night and some did not.

At midnight my mother brought jars of succotash. She had been cooking all day for this dance, and every day after that she cooked and ground corn and baked bread in the ashes. Every morning we gave gifts to Luis and his wife. My cut-off hair and dried beans and cooked food and the hand woven cotton that I wore for a dress. And to the girl friends who danced beside me, I gave my beads and my baskets because these people had suffered and endured sleeplessness with us.

We stopped dancing in the dark of the morning and then my mother

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said: "Come and get firewood. Do you want to grow up a lazy woman?" So then I went out in the dark to pick up the dead branches and bring them back before I slept. It seemed I slept only an hour before they were saying: "Get up! Get water. Get wood. Grind the corn. If you sleep at this time you will be sleepy all your life."

Oh, I got thin in that time! We girls are like strips of yucca fibre after our coming of age is over. Always running, and mostly gruel and ash bread to eat, with no salt. And dancing every night from the time the sun sets until morning-stands-up. I used to go to sleep on Luis' arm and he pinched my nose to wake me.

Every night they came, the people who were not too sleepy from the night before. And always the young people came. Even Luis did not know songs enough for all that month and other men sang, too. It is a nice thing for a man to know maidens' songs. Every man likes to dance next to the maiden and to hold her on his arm. But Luis was an old man and his wife danced opposite. The wife always does.

At last the moon had come around again and they gave me a bath. It was over. I looked like half of myself. All my clothes were gone. All our dried corn and beans were eaten up. But I was grown up. Now the medicine man could cleanse me and give me a name.

You have to be cleansed as soon as the month is over; you must not wait. A cousin of mine did that once. She meant to be cleansed but she just waited. I think, perhaps, she did not have anything to pay the medicine man. But while she waited, one of her brothers was chopping wood. Something fell on him like a hot coal and killed him. So I went the day after my bath.

My mother and I went to the house of the medicine man early in the morning, with a big basket my mother had made, to pay him. He drew a circle on the ground and made me sit in it, crosslegged, with my back to the rising sun. In front of me he put a little dish. Then he walked away where we could not see him and took something out of a little deerskin bag. It was the clay that he carries to charm the evil away from women. No one ever sees the medicine man dig up that clay and no one knows how he mixes it. But I know, because my brother was a medicine man and because I myself have seen things. He grinds up the bone of a dead man and some owl feathers so that they are fine dust.

He put that clay in a tiny bowl before me, mixed with a little water. Then he walked up and down four times, facing the sun that was behind me. Every time he came up to me he blew over my head and dusted me off with his eagle feathers to brush away the evil. And every time he turned,

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The third brother was called Shining Evening and he was a man-woman. His parents suspected it when he was very young because he never wanted to play with boys, always with girls. So they thought they would test him. They built a little enclosure and in it they put a bow and arrow and some basketry materials. They told the boy to go in there and play, and when he was busy they set fire to the enclosure. They thought they would see which things he saved. Out he came, carrying the basketry materials. They tried the same thing again and again after that, and it was always the same. The man-woman was very pleasant, always laughing and talking, and a good worker. She was so strong! She did not get tired grinding corn as I did, so sometimes she did it for me. That was something my husband could never do even though he was kind. It would look too bad for a man to grind corn. I found the man-woman very convenient.

I lived happily with those people and of course we never quarreled. Why should we do that? And strangely, soon after I had been married, I became dangerous again, for the first time since I had been danced. We told the medicine man and he thought, perhaps, I should be danced again and my husband, too. Who knows what danger there had been without our knowing it. So they danced us.

But this time it was different. I did not have to work hard because I had been through all that. I did not even have to sleep in the Little House. I slept in the big house next to my mother-in-law. My husband slept on the other side of the house. Every night we danced, Ah, we danced, we danced. All my life I had wanted to do that. In the daytime I could sleep. Sometimes I slept all day and waked in what we call the red evening to hear the rattle outside the house. Have you heard the rattle when our people come up in the night to dance? Ah, good!

The old people watched me until it was over, and then my husband and I ate the white clay together, and we could touch our heads and have salt in our food and go on as before.

One day my father-in-law said: "Should not our daughter-in-law be tattooed? Her face does not look right, all light, with no black on it." So my mother-in-law tattooed these four marks I have on my chin. I lay on the floor with my head in her lap and she pricked the lines with cactus thorns. Then she rubbed in greasewood soot. It hurts frightfully but if you keep still, the marks come out narrow and clear. If you wiggle they are all blurred. I did not wiggle, but I have seen girls whose chins just look as though black juice had run down them. Mine came out very pretty and, for four days, while they healed, I ate only cactus joints to make them blue.

That fall our people were going over to race with the River People

4: Joseph et al D, E-5 (1942-1943) 1949
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513 push the wide wooden slats together and lay blankets on them. Beds stand in the yard in summer, with the bedding rolled up during the day to keep it clean; in winter they are moved indoors.

264 Eating arrangements are also characteristically elastic. In the eastern districts, where every house has a table and chairs, family meals are the general practice, but no one is concerned if some member arrives late or not at all. Fiestas are the only occasions when group eating seems important.

● 262 No longer does the desert furnish all the food. Only two wild plants are still important in the Papago diet: the cholla bud and the fruit of the saguaro cactus. These plants are good sources of sugar, vitamins, and minerals.[1] Various seeds and wild greens are still gathered in season, but decreasing use of wild products has followed the introduction of stores on the Reservation, and Papago food is now rather like lower-class Mexican or Yaqui food. The usual three family meals each day are much alike in basic pattern: coffee, tortillas or bread, and some bean or other legume, which "makes the meal." These foods are supplemented by other vegetables and sometimes by meat, cheese, and eggs. Green corn is used in many forms—fresh, or dried and roasted and then ground for boiling alone or with black-eyed beans. Wheat is used in whole-wheat tortillas or bread and as pinole. Squash is boiled or baked, either fresh or dried, and several varieties of peas are also eaten. Principal meats in the diet are beef and chicken, but their use varies with the economic status of the family, for not all have cattle or poultry, and meat in the stores is expensive. Rabbits and other wild game provide additional meat.

527 262 The fiesta is the occasion when delicacies are set forth. Fiesta foods include tamales and beef stew, with raisin rice pudding or canned fruit for dessert. Baker's bread and cake are greatly esteemed. Food for the fiesta is carefully planned and prepared, and an effort is made to serve the choicest dishes. In the home, however, it is considered pure ostentation to set too good a table.

146 262 Many Papago children show signs of malnutrition,[2] as the modern Papago diet has deficiencies, the most serious of which is in vitamin C. In those seasons when fresh vegetables and wild greens are not available, the Papago eat very few foods which are rich in this vitamin; oranges and tomatoes are not grown on the Reservation and are expensive to buy. Nor is vitamin A very plentiful in the diet. Milk is used almost exclusively in coffee, and the total amount consumed is limited. School children must learn to drink milk, as many adults believe that undiluted it is bad for the stomach. As noted in

1. For a comprehensive study of Papago diet see Emma Reh, "An Economic Study of the Papago Indian Reservation, Arizona" (MS).

2. See Part III of the study.

4: Joseph et al D, E-5 (1942-1943) 1949
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chapter iii, most families who own cattle do little slaughtering for themselves and thus do not eat the organ meats and blood which were an important part of Papago diet in the old days. School lunches are helping to supply some of these dietary deficiencies, but experimentation and education will be necessary before home diets are improved.

THE PAPAGO HOUSEHOLD

The family is the most important unit in the Papago social structure, whether home is a tiny structure of wattle-and-daub or a five-room house with a shingle roof, wooden floor, refrigerator, washing machine, and radio. Family solidarity is strong. Most often, and ideally, a household consists of the old parents, unmarried sons and daughters, and married sons with their wives and children—three generations in all. But, since relatives may always be depended on for hospitality, the constitution of the household shifts as convenience and necessity require. Any relative is given a temporary or permanent place in the domicile as long as he is willing to assume his share of responsibility for the family livelihood and to fit quietly into the family structure. It is a rare household that does not include a widowed daughter, a distant cousin, a child whose parents have died or remarried; or an "illegitimate" child. Brothers or sisters of the old parents (also regarded as grandparents by their siblings' grandchildren)[3] may also be part of the family. Many and varied are the combinations of relatives who may live together.

Thus a Papago child is usually born into a family that includes not merely his father and mother and brothers and sisters but several other relatives. The precise combination does not signify. Whether his grandparents are maternal or paternal, whether the other adults are his aunts and uncles or more distant relatives, a child's family relationships are such that the absence of one particular relative is no deprivation, if there is another who can take his place. Both the child and his relatives are prepared to accept substitutes even in the essential roles.

Every relative, however, has his proper designation. Some kinship terms differentiate persons who would, in English, have a common appellation. Thus there is a different term in Papago for an uncle who is the mother's younger brother from one who is the father's older brother. On the other hand, the same terms are used for persons who are differentiated in English. Brothers and sisters and all degrees of cousins are called by one of two terms; these terms do not distinguish sex but rather the comparative ages of the speaker and

3. Siblings are children of the same parents.

4: Joseph et al D, E-5 (1942-1943) 1949
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vulgar.[8] Toward the end of his dance men or women from the crowd may join the *pahkowla*. Afterward the dancing goes on as before. Sometimes there are fireworks, a chicken-pull, or an olla-breaking.[9]

Meanwhile in the feast house the male members of the host families are serving all the guests with chili, tamales, coffee, wheat buns, possibly beans, *garbanzos* (chick-peas), a meat-vegetable stew, and usually rice pudding or stewed fruit. There is considerable drinking in the darkness away from the fire and, since it is impolite to refuse a proffered bottle, a good deal of drunkenness. The police are frequently invited to be present in order to prevent trouble.

The fiesta does not break up until all the food is gone, perhaps at dawn or noon of the following day. Then the orchestra plays "Home, Sweet Home" in waltz time to close the dance.

On certain feast days there are special observances. On San José's Day friends tie silk scarves, belts, and other gifts on the arms of all the men and women named for the saint, in a ceremony called "tying the Joses and Josefinas." The Joses and Josefinas must then reciprocate by pouring drinks for the givers and finally for the whole crowd. At the fiesta of San Francisco objects blessed during the annual pilgrimage are brought out for the edification of the crowd.

MAGDALENA

Faith in San Francisco Xavier and his good works has a deep hold on all Papago Catholics and is one of the main foci of Sonora Catholic belief. To some of these Indians this saint seems even more important than the Trinity, and every family hopes to make a pilgrimage to his church at Magdalena in Sonora, Mexico, each year.

Padre Kino, who brought Christianity to the Papago, dedicated the Magdalena church in 1711 to the patron saint of the Jesuits, Francis Xavier. During the ceremony Kino took ill at the altar and died shortly thereafter. He was buried in the church near the altar. As the fame of Kino's work among the Indians spread, the church became a shrine to which great crowds came from all over northwestern Mexico and what is now Arizona to celebrate the saint's day, December 3. Apparently when the Franciscan order replaced the

8. The *pahkowla*'s dance and jests may be copied from the Yaqui *fariseo*, whom the Papago see perform in the United States and in Mexico, particularly at Magdalena. On special occasions the Papago *pascolas* from Arizona Yaqui villages to dance for them.

9. In chicken-pulling, a rooster is buried up to the neck and riders run their horses toward it, leaning over to try to pull it out of the ground. In olla-breaking, people take turns hitting with sticks at an olla full of candies which hangs from a corner of the church. When someone succeeds in breaking the olla, everyone scrambles for the sweets that fall out.

5: Castetter & Bell N-5 (1938-1940) 1942
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products. However, his visit may have followed a season when no crop was planted on account of late rains, such as Kino[36] cited in 1701 in the vicinity of San Rafael del Actúm Grande (in southern Arizona), where no maize had been raised by the Papago that year because of a like situation.

All our informants agreed that wild plants and animals formerly constituted a much larger, and much more dependable, fraction of the total Papago food supply than did cultivated plants. Seasonally women devoted themselves to the gathering of wild foods while men and boys hunted rabbits. When the wild foods ripened, large quantities were gathered and stored, but, just before the giant cactus harvest, food became very scarce, as indicated by one of their names for the period that would correspond to our month of May, *ko'ohk macaṭ*, "the painful moon." One informant said that when he was a boy it was not uncommon to "be so hungry that a person became dizzy when he stood up." As in the past, so today, the Papago utilize much more wild plant and animal food than do the Pima; in fact, it is now comparatively rare to find the Pima gathering wild foods of any kind, while many Papago still utilize them to some extent as a matter of necessity, for Papago agriculture is today almost as precarious as in olden times.

Underhill[37] has well pointed out that poor as the Papago country was, its economics were those of abundance. Much the same outlook is still to be observed among the Pima, despite their deculturation. The Pimans did not hoard property; they were constantly making gifts, chiefly of food, for their food supply, meagre though it seems viewed from our standard of living, was more than sufficient for their simple needs, and anything beyond the bare necessities for sustaining life was regarded as a surplus. Papago migratory life, involving the difficulty of food storage, added to the problems of preserving food in so hot a land, greatly fostered

[36] Bolton, *loc. cit.*
[37] Underhill, *Papago*, pp. 90-2.

5: Castetter & Bell N-5 (1938-1940) 1942
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gelin[60] finds Kroeber's estimate of one acre of cultivated land per person much too high at least for the Shawnee during the eighteenth and nineteenth centuries, but does not dispute his figure of fifteen to twenty bushels of corn necessary to support one person for one year. Accepting the weight of fifty-six pounds of shelled corn per bushel (Pima-Papago corn averages three to four pounds less), Kroeber estimates that one thousand pounds of corn (in round numbers the annual yield of one acre, about eighteen bushels), or a little less than three pounds per person per day, should more than sustain the average person in a community composed of men, women and children.

Under early conditions Piman native corn yielded on the average only ten to twelve bushels of shelled corn per acre, although as grown by the U. S. Field Station on the reservation at Sacaton the same corn yields twenty to twenty-five bushels; teparies, under native conditions, five hundred to eight hundred pounds per acre—under Field Station cultivation, as high as fifteen hundred pounds; and wheat, an introduced crop, ten to twenty bushels with native culture, and forty to fifty bushels at the Station.

In our judgment the figure of 1.79 acres of cultivated land per person as derived from the data of Clotts[61] is too high when applied to the whole desert Papago area. Our most reliable figures indicate that the desert Papago, before white contact disturbed their economic pattern, cultivated from one-fourth to a maximum of two acres per family. Allowing an average of twelve bushels an acre, this means a crop of about three to twenty-four bushels of shelled corn, or its equivalent in teparies and pumpkins, per family. Assuming a family size of five, this would allow about three-fifths to five bushels per person per year. In terms of Kroeber's subsistence level (eighteen bushels per person per year),

[60] Voegelin, *The Place of Agriculture in the Subsistence Economy of the Shawnee.*

[61] Clotts, *op. cit.*, p. 80.

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Pi Pa 194 241 311 262 this would indicate the desert Papago cultivated food supply ranged approximately from one-thirtieth of the annual food consumption among some families to one-third of the total among others. Actually, however, the figure was somewhat less because of several factors: (1) On Papago cultivated plots not all the land was level and therefore portions of it were not tillable since they could not be flooded. This was particularly true at points where water entered fields and deposited silt; (2) Papago (and Pima) ate a large fraction of their corn crop in the roasting-ear stage and this reduced its actual yield in terms of total food value. This practice has rendered it very difficult to compute yield of maize per acre; (3) it was customary for Papago (and Pima) to gorge themselves when food was abundant, with little providence for the future. This resulted in such an inequable distribution of the crop that frequently this entire food supply was eaten up by the end of December.

On the above basis, our field and historical studies of the Pima level of economy from the standpoint of their agriculture indicate that anciently the cultivated acreage per Pima family was two to five acres. In arriving at this figure we are guided somewhat by the amount of land it was possible physically for a family to cultivate with primitive implements. Again assuming an average family size of five, we arrive at a figure of two-fifths of an acre to one and one-fifth acres per person, or five to fifteen bushels of corn or its equivalent per person per year. This would mean the cultivated crop supplied approximately from one-fourth of the total food requirements among some families to nearly the entire amount among others.

Pi 194 241 311 262 The conclusion we are forced to draw from our own field studies, as well as historical accounts as to the ancient basis of Pima subsistence, is that, before white contact radically disturbed the economic pattern, the Pima cultivated crop in average years comprised about 50 to 60 per cent of the total

5: Castetter & Bell N-5 (1938-1940) 1942
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food supply, wild plants and animals constituting the remainder; thus food gathering was absolutely necessary to supplement the inadequate cultivated crop. Our estimate is supported by Russell's[62] statement made forty years ago that mesquite constituted nearly, if not quite, the chief native article of Pima diet in primitive times; also by that of Whittemore[63] that mesquite beans were the principal article of Pima food. Mesquite was a dependable food and the Pima ate it in abundance every year. Their aboriginal crops were maize, beans, pumpkins, cotton and gourds. In years of inadequate water supply or crop failure from other causes they were forced to rely even more heavily upon wild plant and animal foods. Their strong reliance upon wild foods, chiefly mesquite and sahuaro fruit, supplemented by screwbean and cholla buds and fruits on the plant side; plentiful jackrabbits and less numerous deer and mountain sheep, as well as fish (although they had less access to fish than did the Colorado River peoples) and beaver on the animal side, bespeaks that agriculture was not overwhelmingly their basis of food supply. Wild plant products had a much more important place in their diet than did game, the ratio being about three to one. Apart from the killing of rabbits, hunting never constituted a major occupation, but a hunter would usually get about a half dozen rabbits in a day's hunt.

On the basis of our similar studies among the Papago, it is possible to conclude that anciently these Indians in average years cultivated only about one-fifth of their total food supply, four-fifths consisting of wild plant and animal products, supplemented by such variable amounts of cultivated foodstuffs as were secured from the Pima and their relatives in the San Pedro and Altar valleys in exchange for labor. In years of poor crops the balance was shifted even further in the direction of native wild foods and reliance upon these relatives and friends.

[62] Russell, *op. cit.*, p. 74.
[63] Whittemore, *op. cit.*, p. 51.

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Papago utilized considerably more native plant food than wild animal life, the ratio being approximately four to one; also more deer and less rabbits than did the Pima. These native plant foods were mainly sahuaro and organ-pipe cactus fruit, cholla buds and fruit, mesquite beans, seeds of ironwood and paloverde, certain greens and sand root. Several months of every year were spent by the women gathering and preparing wild plant foods, and every family spent three or four weeks in late June and July gathering sahuaro, the women doing the gathering and preparing the fruit, the men guarding camp and hunting rabbits and rats. Among animals their reliance was upon deer, and, in diminishing order, rabbits, antelope, mountain sheep, rats and larvae. A family group formerly had no more than one or two hunters, each killing about twelve to fifteen deer per year. Many families had no hunter, so the kill was distributed among the entire economic unit with which they were affiliated, ranging usually from two to ten families.

Thus it is obvious that in normal years of crop production the Papago made much more extensive use of wild products than the Pima. In comparison with the Maricopa the Pima depended appreciably more upon cultivation and less upon wild products than did these neighbors on the Gila, to whom mesquite and screwbean are reported as more important than maize.[84] Bartlett[85] wrote in the middle of the last century that Leroux had ascertained the Pima were much better supplied with corn and every other commodity than were the Maricopa. The stronger emphasis upon agriculture by the Pima as compared with the Maricopa is attested also by the presence of extensive canal irrigation, while the Maricopa depended entirely upon the inundation of flood plains and sub-surface seepage.[86]

Although the agriculture of the Gila Pima and the Papago

[84] Spier, *Yuman Tribes*, pp. 48, 58-9.
[85] Bartlett, *Narrative*, II, 251.
[86] Spier, *loc. cit.*

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was on a lower technological level than that of the irrigated valleys of Sonora, these Indians were relatively good farmers. Despite the fact that they, particularly the Papago, cultivated small acreages, they did so intensively. The supreme Piman virtue was industry. The farmer arose before sunrise, worked without cessation until near noon and rested during the hottest part of the day, then continued work until dark. The hoe prevented rapid labor; hence his toil was slow and plodding but unremitting.

[redacted]

In the Papago region certain wild foods were [redacted] sahuaro fruit was the most important. [redacted] among the Papago [redacted] Papago [redacted] Pima [redacted] Papago [redacted] Pima [redacted] Papago [redacted] Pima

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cholla (*O. versicolor*) and of the related *O. spinosior* were valued to some extent. The fruits, and to a lesser degree the joints, of prickly pear cacti of several species, especially *O. Engelmannii*, ranked high in the diet. That such fruit, known as tunas, was a staple food in Kino's day is indicated by his experience among the Papago near Santa Eulalia (in Sonora);[69] Anza,[70] three-quarters of a century later, observed that among the Papago at Quitobac, "*nópoles* which they avoid, taking off the spines" were one of the usual foods. This was doubtless the fruit of a species of *Opuntia*.

Another Papago staple was the fruit and seed of mesquite (*Prosopis velutina*), as plentiful in the riverine valleys of the Papago country. [illegible] "*mesquites* which they [illegible] their seeds were ground." In this connection, Bell[71] noted that the Papago maintained a diet "largely vegetarian" and that "mesquite beans were ground." In this connection, Bell[72] noted that the Papago maintained a diet largely vegetarian in character. The principal [illegible] were the seeds of mesquite (*Prosopis velutina*), which were ground and [illegible], those of [illegible] (*Cercidium microphyllum*).

Staple root crops were the sand root (*Arenaria* sp. nov.), often referred to as wild potato or wild sweet potato; *Fumaria tenuifolia*, which grew on the flood plains near the villages, and to a lesser extent *Mentzelia Nuttalliana*. Entire families went out with digging sticks to gather these several roots, and lived on them while they lasted. Bulbs of coyonar or Papago blue bells (*Brodiaea capitata* var. *pauciflora*) were of less importance, usually eaten raw in early spring before other foods were available. Mange[73] wrote in 1694 that the food of Indians (doubtless Soba) at rancheria El Comac in Sonora was "some roots of wild sweet potatoes [probably sand root, at least in part], the pitaya in their sea-

[69] *Ibid.*, p. 144.
[70] Bolton, *Anza*, II, 22, 130.
[71] Bolton, *Kino*, II, 227.
[72] Bell, *op. cit.*, pp. 216, 219.
[73] Mange, *op. cit.*, pp. 216, 219.

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son and a red fruit which is given toward the sea." Also that the Papago south of Vacpia (in Sonora), who had never before seen Spaniards, sustained themselves with "roots or wild sweet potatoes," mesquite and other small fruits. He also makes mention of the importance of roots near La Dura Eddy, at Bacapa and at Basoncito (in Sonora).[78] Likewise Font[79] referred to sáhuaro, pitaya, seeds of various grasses and various roots similar to the sweet potato (camote), as well as cereals among the Papago. In 1920 Lumholtz[80] wrote that during March and April the Papago in certain areas formerly gathered in the large lagoon and hills and lived almost entirely on [illegible]

[illegible] was gathered along the Mexican border and purchased by parties who went to Sonora to intoxicate. The fruit of saiil (*Yucca baccata*) furnished variety to the diet and was always gathered in August by the men when available, but plants often failed to fruit. Yucca was obtainable on the plains of the Papago country only at the head of the Altar Valley.

Small greens utilized in their season were amaranth, pigweed or *bledo* (*Amaranthus Palmeri*), lambsquarter (*Chenopodium* spp.) and saltbush (*Atriplex Wrightii*). Cañaigre (*Rumex hymenosepalus*) was of less importance. These, particularly pigweed, were never dried and stored but while in season constituted the main, if not the only, article of diet.

Acorns were highly valued but neither common nor easily accessible. Whenever those of black oak (*Quercus Emoryi*) or *Q. oblongifolia* were available without too much effort, or

[78] Ibid., pp. 183, 185, 186-87.
[79] Bolton, *Anza*, II, 320.
[80] Lumholtz, *New Trails*, pp. 308-09.

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could be secured by trade, they too constituted an interesting adjunct to the diet, and were eaten without leaching. These were found largely in the southern part of the Papago territory, as in the Baboquivari Mountains and the orchard-like forests of oak in the Tumacácori Mountains. Velarde[28] reported the important fruits of the land were tree cactus (evidently saguaro and pitajaya), tunas, acorns and wild nuts.

The Papago formerly utilized to a fair extent the small seeds of several species of plants, but these largely have fallen into disuse. Most valued were [illegible]

[illegible]

[illegible] Papago, lived on wild fruits supplemented by vegetables obtained from the Pima in exchange for [illegible]. Lumholtz[29] described them as depending chiefly upon the mesquite, gathering the pods annually, and mentions a lone Papago hermit who lived almost entirely on this food; they also extensively utilized chia (*Salvia chia*) as well as mesquite beans, in search of which they traveled as far as Quitobaquito, Santo Domingo and the lower Sonoita River. Also of considerable importance were saguaro, pitajaya, *palo fierro* or ironwood, and a succulent plant of the sand dunes, *hierba salado (Oenothera trichocalyx)*, which was prepared by boiling. Díaz[30] noted in his diary (1774) that the Papago (doubtless Sand Papago) living in the sierras between El Carrizal and the Gila, in extreme southwestern Arizona, maintained themselves, so far as plant food was concerned, on mesquite, screwbean, pitayas, tunas, saguaro and certain roots. Although the Sand Papago almost completely lacked agricul-

[28] Mange, *op. cit.*, p. 309; Wyllys, *Velarde's Relación*, p. 228.
[29] Gifford, *The Coconpa*, p. 180.
[30] Lumholtz, *op. cit.*, pp. 204, 330-32.
[30] Bolton, *op. cit.*, pp. 280-81, 289.

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ture, a single agricultural site is attributable to them at Survuk, southeast of Tinajas de Emilia, in Pinacate. Here, by means of the planting stick, were sowed on a very small scale maize, beans and pumpkins. Once a year they journeyed to the Yuma and bartered baskets and sea shells for maize, teparies and pumpkins. Emory[49] observed that they subsisted principally on fish.

One Pima informant agreed that the predominant native food plant was mesquite, followed in order by [illegible]

[illegible] Pima [illegible] mesquite [illegible] Gila [illegible] mesquite [illegible] beans [illegible] pumpkins), [illegible] Castetter[50] noted the great importance of mesquite as a Pima food. Similarly Russell[51] found the most important, abundant and accessible Pima wild foods were mesquite and saguaro; even in his day both were extensively utilized. This is supported by Whittemore's[52] statement in 1893: "The *principal* article of food was the bean of the mesquite, ..." which was gathered by large parties. Lloyd[53] also says that, up until shortly before 1903, mesquite beans and fruits of various cacti were staple articles of food. One informant, Manuel Lowe, insisted that cholla buds formerly constituted the most staple wild plant food. The jumping cholla (*O. fulgida*) was very plentiful on plains adjacent to the Gila and therefore easily accessible. However, *O. echinocarpa* thrived more in the hotter areas.

[49] Emory, *Report on the U. S. and Mexican Boundary Survey*, p. 129.
[50] Bahti, *op. cit.*, pp. 380, IV, 44.
[51] Bartlett, *op. cit.*, p. 184.
[52] Castetter, *op. cit.*, p. 449.
[53] Russell, *op. cit.*, pp. 68, 71, 74.
[54] Whittemore, *op. cit.*, p. 94.
[55] Lloyd, *Aw-aw-tam Indian Rights*, pp. 139-40.

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The remainder of Pima native plant economy was, in general, quite similar to that described for the Papago, with only such departures as were imposed by vegetative differences of their area. Thus, the organ-pipe cactus and the sand root were not available in their region; in fact, roots of any kind except *Monolepis Nuttalliana* were little used. Mescal, because of its scarcity in the area, ordinarily was gathered only in time of famine, but was sometimes secured from the Papago in trade. On the other hand, there was a greater abundance of mesquite than among the Papago and this was of marked significance in their diet. Also the screwbean *(Prosopis pubescens)* abounded along the Gila and ranked high in Pima economy, though little known to the Papago. Acorns were secured only by trade from the Papago. Neither Pima nor Papago utilized sunflower seeds.

It should be noted here that the importance of specific wild plants in Pimería Alta varied somewhat locally, depending upon their abundance geographically and from year to year. In addition to those listed the Pimans utilized many others of less value, and these have been discussed in detail elsewhere.[87]

Utilization of Native Wild Animals

Wild animals constituted a valuable source of food for both tribes in early days, and the proportion of game in the diet was greater than at present. Chico Bailey said that when he was a boy the Papago in his area almost always had meat at each of their two meals (doubtless beef in part). The mule or black-tailed deer *(Odocoileus hemionus)*, formerly more abundant in Pimería Alta and hunted throughout a large part of the year, was of considerable value as a source of food and clothing for both Papago and Pima. This also is indicated for the Papago by the fact that it was the game animal around

[87] Castetter and Underhill, *Ethnobiology of the Papago Indians*; Russell, *op. cit.*; Hrdlicka, *Physiological and Medical Observations*.

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which some of their ceremonies centered. Pima informants maintained that as a source of animal food it ranked second only to the black-tailed jackrabbit which was also emphasized in Pima ceremonials. More rarely hunted by both peoples was the Arizona white-tailed deer (*Odocoileus couesi*), found only in the mountains. Antelope (*Antilocapra americana*) were formerly quite plentiful, as indicated by the fact that the international boundary survey of 1892-94 found antelope in every open valley along the border between Nogales and Yuma. They were sometimes stalked by both peoples, particularly in the tall grassland in the eastern part of Pimería, but did not constitute a dependable source of food and were more rarely hunted than were deer. When the Gila dried up, as it did periodically, both Papago and Pima stalked deer and antelope at water holes. Bear were not taboo, but were never hunted.

Some information on early utilization of animals was presented by Kino, who related that in 1698 Sobaipuri Indians at Quiburi, on the San Pedro, furnished him various "spoils" including buffalo and deer skins, also buckskins at San Xavier del Bac. The buffalo hides were doubtless obtained from farther east, either by trade or through hunting expeditions. Toward the end of his memoir he writes of the natives of Pimería having many deer and buffalo hides, and antelope skins.[88] Likewise Font,[89] writing in 1775, noted that the Gila Pima women covered themselves with deer skins. Velarde,[90] too, writes of the many deer in Pimería, pointing out that among the Indians to the west the hunting of deer was more common. The Soba at Pitiquín and Caborca were absent hunting deer when Mange[91] visited there in 1694, and the Soba men at El Comac were nude, only the women clothing themselves with "soft skins of hare and deer." In the

88 Bolton, *Kino*, I, 183, 292; II, 267.
89 Bolton, *Anza*, IV, 49.
90 Mange, *op. cit.*, pp. 310, 312; Wyllys, *op. cit.*, pp. 129, 132.
91 Mange, *op. cit.*, pp. 216-17, 220.

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middle of the nineteenth century Audubon[88] characterized the Papago as living on turtles and what game they could get, and said "I have seen some elk and antelope skins dressed and terrapin shells are everywhere. We have bought two terrapin ... some roots and the fruit of a plant like the maguey.... The Indians kill them (lizards) with a light wand, giving them a dexterous tap on the head." He also described a kind of mush made of dried grasshoppers, pounded and mixed with meal.

Rabbits were easily secured and were very important to both peoples for food and clothing. Three kinds occurred in the area—the California or black-tailed jackrabbit *(Lepus californicus eremicus* and *L. californicus deserticola)*, the antelope or white-sided jackrabbit *(L. alleni alleni)* and the Arizona cottontail *(Sylvilagus auduboni arizonae)*; the black-tailed jackrabbits, available at all seasons, were most numerous, the white-sided ones least so. Pima informants maintained that the black-tailed jackrabbit formerly was the most staple Pima animal food and they killed it in large numbers, chiefly in late summer when it was fattest. Although the Papago regarded cottontail meat as sweet and that of the other varieties poor, the black-tailed jackrabbit was nevertheless of considerable value as food because it was both plentiful and available at all seasons. Except for the communal drive made just before the Papago drinking ceremony, rabbits were often shot by boys, who were expected to keep the family supplied. Men did shoot rabbits when encountered, but made no specific search for them unless other foods were scarce. Some indication of the early situation in this regard is given by Kino,[89] who reported that in going from the Gila to La Concepción (Caborca) in Sonora, the Indians (largely Papago) in all places gave the Spaniards hares, deer, rabbits etc., from their hunts.

Mountain sheep *(Ovis mexicana)* are now rarely seen, but

[88] *Audubon's Western Journal*, pp. 148-50.
[89] Bolton, *Kino*, I, 187.

5: Castetter & Bell N-5 (1938-1940) 1942
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anciently were fairly abundant over portions of Pimería, and a food of considerable significance in Piman diet, although the Pima ate fewer than did the Papago as distances were too great to hunt them. Papago camped seasonally near the mountain tanks or springs and lay in wait for wild sheep. Lumholtz[94] wrote in 1912 that they were still to be found in Sierra del Viejo and Sierra del Alamo, and in rare instances survived almost as far as Hermosillo; Hornaday[95] has presented in some detail the distribution of these animals in Mexico, including *O. canadensis*. They were fairly common in the Pinacate region of northwestern Sonora. Bryan[96] has listed specific points of their occurrence in southern Arizona and Sonora within the present century.

At the close of the seventeenth century Mange[97] found at Bacapa (in Sonora) eighty Papago who sustained themselves with roots, deer and mountain sheep, and noted that part of the people had gone hunting sheep. He encountered at the Pima village of Tusonimo or La Encarnación, in the vicinity of present day Blackwater, on the Gila, a large mound or hill of mountain sheep horns *(carneros cimarrones o silvestres)*, which he estimated contained more than 100,000, and this abundance of horns led him to conclude sheep must have been their common food. Similarly Anza,[98] in seeking to open a land route from Sonora to California, observed in 1774 that in extreme southwestern Arizona, at what are known as the Cabeza Prieta Tanks in the Cabeza Prieta Range, as well as other *tinajas* in the area, certain Papago always camped during the height of the dry season to hunt mountain sheep which came there to drink. In his description he states that whenever the Papago killed a sheep they were very careful to preserve its horns; these were carried to the neighborhood of the water holes and piled there to

94 Lumholtz, *op. cit.*, p. 220.
95 Hornaday, *Camp-fires on Desert and Lava*, pp. 399-44.
96 Bryan, *Papago*, p. 49.
97 Mange, *op. cit.*, pp. 235, 265.
98 Bolton, *Anza*, II, 29-30, 155.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU2P
Pima NU2Q

Pi Pa 224 262 "prevent the Air from leaving the place." Also they cautioned others against removing them because "that element would come out to molest everybody and cause them to experience great troubles." One of our Pima informants, Manuel Lowe, said mountain sheep horns had to be handled carefully and even then rainy cold spells would occur. They must never be tossed out or thrown around, but placed in a designated spot where no one would bother them lest they interfere with the winds and the rains. This was mentioned by Russell[99] for the Pima, and also has its counterpart among the Maricopa.[100] Russell states the Pima ate mountain sheep when obtainable, although even in his day they were no longer abundant, only a few remaining in the Superstition Mountains and in other high ranges on and around the reservation. His experience with a Gila Pima chief indicates these Pima regarded mountain sheep as food fit only for the Papago, who had no fields to look after. However, our Pima informants were all of the opinion that this animal was always eaten when available but that it was of much more importance anciently; and this would seem to be confirmed by Mange's experience at Tusonimo.

Pi Pa 224 262 136 The peccary, *javelina* or *jabali* (*Pecari angulatus*) was fairly plentiful in places although not utilized for food to any great extent. Our observation is that neither Papago nor Pima seem to have cared greatly for it, although Lumholtz[101] thought it was much relished by the former. Russell[102] noted it could not have been an important article of diet among the Pima. Nevertheless the Pima did hunt it somewhat in the desert country to the east of Sacaton.

Various rats were eaten, particularly by the Papago, the packrat (*Neotoma* sp.), most common food in the group,

[99] Russell, *op. cit.*, p. 82.
[100] Spier, *op. cit.*, p. 71.
[101] Lumholtz, *op. cit.*, p. 169.
[102] Russell, *op. cit.*, p. 80.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

being rather extensively utilized. An early reference[103] characterizes the Papago as living on seeds, grass, rabbits, rats and wild fruits.

A few birds were included in Piman diet, Gambel quail *(Lophortyx gambelii)* providing the main source of supply, with the abundant western white-winged dove *(Melopelia asiatica mearnsii)* and the mourning dove *(Zenaidura macroura marginella)* also ranking high. The only eggs utilized were those of the Gambel quail. Merriam turkey *(Meleagris gallopavo merriami)* was to be found more plentifully in the mountains formerly than at present, but was hunted only occasionally and then mostly for feathers rather than food. It was not domesticated, although Velarde[104] noted this would not have been difficult. Russell makes no reference to the use of turkeys by the Pima. Velarde relates that in Pimería there were countless turkeys in the mountains. In the same connection he states: "In some places are found thousands of birds *(pavos o gansos)* which are called chickens of the Indies, large and fat and of pleasant taste."[105] These, too, unquestionably were turkeys.

Highly prized as food by both peoples, but more especially by the Papago, were the larvae of the very common lined sphinx moth *(Celerio lineata)* which is two and one-half to three inches long. These caterpillars occurred in great numbers in limited areas on any vegetation, especially amaranth *(Amaranthus Palmeri)*, during or immediately following the rainy season. With their appearance everyone dropped work to gather this great delicacy, which was dried and stored. This is what Garcés[106] referred to, when on a journey from Tubac to San Gabriel he noted the Papago ate

[103] *Documentos*, 3rd ser., IV, 354; *Rudo Ensayo*, p. 150; Hrdlicka, *op. cit.*, p. 84.

[104] Mange, *op. cit.*, pp. 309-10; Wyllys, *op. cit.*, pp. 129-30.

[105] Mange, *loc. cit.*; Wyllys, *loc. cit.*

[106] Bolton, *op. cit.*, p. 320.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28
Pima NU29

and dried for storage "some yellow-green worms." It is also mentioned by Lloyd.[107]

Lumholtz[108] described the Sand Papago as depending for their animal food upon jackrabbits, which were caught by running them down in the sand; mountain sheep, mule deer and antelope, all three killed with bow and arrow; and muskrats, lizards, and fish obtained on the Gulf Coast. Similarly Díaz,[109] in 1774, observed that the Indians (doubtless Sand Papago) living in the sierras between El Carrizal and the Gila, in extreme southwestern Arizona, maintained themselves on deer, mountain sheep and rats (also mesquite, screwbean, pitajaya, sahuaro, tunas and certain roots). Only one of Underhill's informants, a Sand Papago from Sonora, had any recollection of mountain sheep hunting.

Mange's[110] account informs us of the poverty of some of the Papago as well as the utilization of certain animal foods not heretofore mentioned. Thus he referred in 1699 to a *ranchería* at an eddy, twelve leagues from the Eddy La Luna (in extreme southwestern Arizona), where there were thirty nude and poor Indians "who only sustained themselves with roots, locusts and other wild fruits." Also at Bacapa *ranchería* there were eighty Papagos, nude and poor, who "at times of the year they sustain themselves with shellfish." Likewise, at Basotucán (in Sonora) were nude and poor Papagos whose only sustenance was roots, some shellfish, locusts, and lizards which they called iguanas. One reference characterizes the Papago as not disdaining, in seasons of scarcity, "even snakes, lizards, and toads."[111]

The dog was really the only animal domesticated by either Pima or Papago. A few species of birds were kept captive for their feathers, especially the golden eagle (*Aquila chrysaetos*), the thick-billed parrot or macaw (*Rhynchopsitta pachyrhyn-*

[107] Lloyd, *op. cit.*, p. 124.
[108] Lumholtz, *op. cit.*, pp. 204, 330-33.
[109] Bolton, *op. cit.*, pp. 260-61, 263.
[110] Mange, *op. cit.*, pp. 263, 285, 286-87.
[111] Bancroft, *Native Races*, I, 599.

5: Castetter & Bell N-5 (1938-1940 1942
NU28 Papago NU28
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cultivation of the kidney or common bean (*P. vulgaris*), must await additional data.

Lumholtz,[52] writing of Mexico, noted he had not seen the tepary bean outside of Sonora, although Piper[53] says that in its wild form the species ranges from western Texas to Arizona and southward in Mexico to Guadalajara. It is widely distributed along the western coast of Mexico, and the Russian workers under the leadership of Vavilov have found it under cultivation in Chiapas. They regard *P. acutifolius* A. Gray var. *latifolius* Freeman as having originated in the South Mexican-Central American center.[54] However, Dr. D. D. Brand, of the Department of Anthropology of the University of New Mexico, informed us in personal conversation that he has carefully and systematically examined the markets in western Guerrero and southern and western Michoacan, and in not a single case has found any teparies. One might expect that since they are found in Sonora and in Chiapas they would be found along the entire Mexican west coast. In view of the wide distribution and varietal diversity of the wild tepary, the region where it was first brought under domestication and the wild form from which it was developed need further investigation. In the absence of proof of its origin from the wild forms of *P. acutifolius* A. Gray var. *latifolius* Freeman, perhaps its origin should be sought in varieties farther to the south. Detailed genetic and cytological studies would be of great value in solving the problem of origin.

The Papago, at least, formerly gathered and ate wild teparies. Freeman[55] stated that two old Papago women informed him thirty years ago that they remembered having gathered dark-colored wild teparies during their childhood

[52] Lumholtz, *New Trails*, p. 287.

[53] Piper, *op. cit.*, p. 695.

[54] Vavilov, *Botanical-Geographic Principles of Selection;* Bukasov, *The Cultivated Plants of Mexico, Guatemala and Colombia*, pp. 473, 485, 505.

[55] Freeman, *op. cit.*, p. 14.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
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in the mountains farther south, presumably in Sonora. Thornber[56] informs us that in 1914 he saw an astounding quantity of wild teparies growing near Santa Rosa, just south of the Santa Rosa Mountains on the Mexican border, and that a group of Papago women were gathering the ripe seeds. None of our own informants had any knowledge of the utilization of wild teparies.

From samples of cultivated tepary secured from the Papago and Pima, Freeman isolated and grew forty-seven distinct types, differing chiefly in flower color, and shape and color of seeds. Growth habit, foliage and pod characters of these types showed little difference, except that the white-seeded sorts had slightly smaller leaves than did those with yellow or darker colored seeds.

Both Papago and Pima had only two staple varieties of tepary—the white (really greenish white) and the brown. Black and variously speckled teparies also occurred but were rarely selected or grown as distinct varieties, and many Papagos and Pimas would pull up and discard such plants when found among crops of the white and brown ones. Informants of both tribes, with a single exception, regarded the brown as the oldest of the teparies. A present day factor which limits the growing of teparies is the commercial demand for only the white and brown varieties. The one most commonly found on the commercial market is the white, and this is often brought to trading posts for barter. Both tribes regard the white one as superior in taste and general quality to all the others.

That the kidney bean *(P. vulgaris)* was aboriginal in the Southwest is authenticated by its occurrence at a number of sites in the San Juan Basin belonging to horizons as early as Basket Maker III, such as those of Kidder and Guernsey.[57]

[56] J. J. Thornber, Professor of Botany, University of Arizona. Personal communication, Apr. 26, 1940.

[57] Kidder and Guernsey, *Archaeological Explorations in Northeastern Arizona*, p. 98.

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
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and dried seed corn was to be stored it was mixed with wood ashes and placed in ollas. Among the Pima, a cotton cloth was then placed over the top of the olla and sealed with mud made of saline soil, while the Papago usually sealed such ollas by applying mud mixed with grass to the improvised lid. All the seed placed in an olla was of a single color and type, and there was never any mixture. Seed corn was eaten only in case of emergency. No seed or food crop was ever stored in hides.

In some cases seed ears were braided together in clusters by means of their husks, hung outdoors until dried, then suspended from the ceiling in the house.

There was no storage ritual for either food or seed corn.

Utilization of Corn

Informants said blue corn was used mostly for parching, white regarded as best for pinole and yellow as most suitable for tortillas, although these categories were not always maintained. The Pimans utilized a good deal of green corn for food, but in no case was a special planting made for this purpose, such ears simply being removed from regular crops. Several informants said it took a little more than "two rounds of the moon" from time of planting to get good roasting ears —about nine to ten weeks. This conforms with our own observation that native Pima and Papago corns produce silks and tassels within fifty to sixty days after planting. One way of determining its suitability for this purpose was by the condition of the silk, selection being made before the silk became entirely dry; another by judging the hardness of grains through the husk. It was eaten in a variety of ways; for example, directly off the ear after roasting unhusked on the embers of a mesquite brush fire, or such roasted corn was dried, then the grains cut from the ear and stored in ollas or shallow baskets; sometimes the grains were scraped from the ear, placed inside several corn husks, wrapped and tied at the ends with shreds of husks, resembling a tamale, and boiled.

5: Castetter & Bell N-5 (1938-1940) 1942
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develop into fruits. A quantity was gathered early in the morning and, after removing the calyx, dried in the sun on a mat or cotton cloth for about three days, then stored in a sealed olla. When used they were cooked with mesquite beans. At times, they were mixed with cornmeal and boiled, the mixture spread out on grass or a cloth to dry for about three days, and stored in ollas. This was again boiled when utilized. Twisted flowers, after removal of the green calyx, were also boiled and eaten with pinole.

Papago and Pima regarded pumpkin seeds as a delicacy. These were parched by placing in a piece of olla with live coals, stirring until done, and eaten much as we eat peanuts; or at times these seeds were parched with corn.

Seed Selection

Pumpkin seed was selected in a general way (by either the man or woman) by simply taking those from the largest pumpkins, size being the most important criterion. Or, if a pumpkin proved to be especially sweet, the seed was saved. This was placed in a small olla with others of the same variety and, when sowing time came, a quantity was taken from the olla and planted without culling out individual seeds.

Teparies and Common Pink Beans

Time of Harvest

The Papago made only one planting of teparies—in July, and harvested in October. The Pima made two; their first planting, as mentioned earlier in this chapter, was made when mesquite began to leaf out, the second soon after saguaro harvest. The first was mature in late June, the second in October.

Informants said if maize and teparies were planted at the same time the maize would be ready to harvest before the teparies, which required a minimum of ten weeks under favorable moisture conditions. They invariably matured

5: Castetter & Bell N-5 (1938-1940 1942
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Pi Pa 244

of pods than do *frijoles* is reported by Freeman,[23] whose experiments showed teparies yielded 450 to 700 pounds per acre by dry farming, compared with 800 to 1500 pounds when grown under irrigation; also that under all conditions teparies outyielded *frijoles* often as much as four to one. There was no difference in the yield of different kinds of teparies.

Utilization

Pi Pa 252 [262]

Dry teparies were customarily cooked by themselves and eaten, or cooked with roasted corn. Pink beans were not considered good unless cooked with meat, preferably fat, and, since this was not always available, their use was somewhat limited. Formerly, in times of food scarcity, women would go out into the field prior to the general harvest and gather such teparies as had already matured, but these were never cooked as green beans (i.e., both pods and seeds). *Frijoles* were usually gathered only when ripe, then dried and stored, but on occasions of need were picked in the pod before ripe, and boiled.

Pi Pa [262]

All Pimans seem to prefer the taste and quality of the white tepary to that of the brown. However, there is a great deal of variability among individuals as regards preference between teparies and pink beans. There is little difference in the nutritive value of the two, although the tepary markedly surpasses the latter in rate and degree of swelling and of absorptive power when soaked in water; also the seed coat of the pink bean is heavier than that of the tepary.

Anciently there was little use for tepary and pink bean vines, although if building a house a person might place some on the roof and cover with dirt. Hulls were never utilized. At present the vines and hulls serve as fodder for cattle and horses.

[23] Freeman, *Southwestern Beans and Teparies.*

5: Castetter & Bell N-5 (1938-1940 1942
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work, as was the cultivation and harvesting. Plants were quite drought resistant.

Only the white-seeded form was grown, as its pods had longer, finer-grained and deeper black strips of epidermal tissue, and therefore more suitable for use in basketry. They were planted in hills about six feet apart with four or five seeds to the hill, in holes about six inches deep, although the seeds were covered to a depth of only two inches.

Pods were gathered as they matured, about the time maize was ripening, but all must be gathered before frost to prevent the black color of the pod from fading. Fruits were ready to harvest when the dry epidermis peeled off readily. The ripe pods were gathered and laid out in piles in the field to dry, and informants said they had seen their mothers spread wood ashes over such piles. When thoroughly dry the pods were hooked together to form large clumps or balls, and stored in a rain-proof building, since weathering affected their color.

Before removing the strips of epidermis for use in basketry, the pods were buried in moistened ground over night to facilitate the stripping. However, more recently some merely plunge the pods in boiling water to aid in removing this tissue. These strips were tied in bundles and stored in baskets or ollas. The process of preparing and utilizing *Martynia* in basketry has been discussed in detail by Kissell.[17]

Seeds of the unicorn plant were sometimes eaten but were of little importance as food. They were removed from the pods at the time the strands of epidermis were stripped, and were dried and stored in a small sealed olla.

Wheat

Time of Harvest

Pima and Papago planted wheat any time from November to February, and harvested in May or early June. However, late sowings usually produced small plants and a poor yield.

[17] Kissell, *Basketry of the Papago and Pima*, p. 201.

5: Castetter & Bell N-5 (1938-1940 1942
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scarce when May came around, and it was common to gather matured heads of wheat, beat out the grains and eat them before the general harvesting was begun.

Watermelons and Muskmelons

Time and Method of Harvest

The Pimans were very fond of watermelons, moderately so of muskmelons. The Pima usually made two plantings of both, the first ready for harvesting in late June, the second in October, although muskmelons were a little later in maturing than were watermelons. The single Papago planting ripened in October. Watermelons were tested for ripeness by their sound when thumped; also they were considered mature when the tendril on the stem of the melon dried and curled up. However, they often were eaten before completely ripe. Ripening of muskmelons was determined by their odor and resistance to pressure. Pima informants said when the first planting of watermelons had matured the fruit was picked, then the vines irrigated and in about six weeks there was a second, although smaller, crop.

Either men or women picked the melons when harvesting, and put them in a pile. A few melons at a time were placed on a mat or cotton cloth laid on the ground, and carried to the house or storage pit, this usually being done by the men.

Storage

The Pimans stored a goodly supply of watermelons for winter use, but did not bury them in sand as did the lower Colorado River tribes, although informants had heard of the Yuma and Maricopa doing so. Formerly they were stored in the oval pit with gable roof as described under "Storage of Pumpkins," but more recently Pimans have used a cubical underground pit about four feet in each dimension, slanting inward at the bottom on all sides and built on a hill if possible. Poles were placed on the bottom of the pit and covered with cornstalks, on which were placed alternate

7: Lumholtz N-5 (1909-1910) 1912
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CHAPTER V

COMOBABI—AN ATTRACTIVE INDIAN FAMILY—MARIANITA—A HORNED LIZARD THAT SPURTS BLOOD THROUGH THE EYE—AN ABORIGINAL WAY OF RECORDING EVENTS—THE PAPAGO CALENDAR—HARVESTING SAHUARO—HOW TO KEEP COMFORTABLE IN GREAT HEAT—A VISIT TO CHIEF ALVINA

Our next halting place was made at the rancheria of 361
Comobabi, comprising a somewhat extensive area on a beautiful slope at the foot of the mountains. Most of the houses here, too, were temporarily abandoned on account of the sahuaro harvest. Early in the afternoon 574
we drove up to a house which impressed us as being the most hospitable looking; the family were just seating themselves on the ground outside, to eat tortillas and [262]
beans, the husband standing near by with his horse saddled. They received us as if we had always known them, although Pablo had not met them before. We were invited to share their food, and, as soon as they were made to understand that I wanted to buy all sorts of Indian things, they cheerfully produced whatever they had. I purchased two bags full of certain eatable seeds, which I had much desired to procure, also a meal basket made by the thirteen-year-old daughter, who had the sweet-sounding name of Marianita, although neither [551]
Spanish nor English was among the family accomplishments.

7: Lumholtz N-5 (1909-1910) 1912
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hours. He thought the number of the Papagoes was decreasing. Few old men were seen any more. The food which is gradually supplanting their native dishes is injurious to the health of the Papago. Children were no longer obedient. The young men nowadays are seized with restlessness and want to leave for other parts of the country; nobody takes care of them, and they die early, he complained. We took a walk together, and he pointed out to me the ripe nuts of the *jójoba*, a bush of common occurrence in that country. They are eaten by the Indians and have rather a pleasant flavor. As they contain a great deal of oil, they might compete with peanuts in the oil industry of the world, were it not for the slow growth of the bush. Mr. M. G. Levy, mine-owner and store-keeper in Ajo, thinks that they will prove of importance as cattle food and that they should be cultivated. Among the frontier population the oil has great reputation as a hair restorer.

On two afternoons we had quite heavy showers, and I felt some regret at having disposed of my large, though inconvenient tent at Indian Oasis, taking with me only the fly. Pablo and I were drenched and so were our blankets. It would have been difficult to make a fire but for the presence of the small resinous bush called *tovoso*, which burned lustily in spite of being dripping wet. We tore the bushes up entire and kept up a bonfire by which we dried ourselves and cooked our food. I began to wonder whether this could truthfully be called a desert.

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

seemed able to live here. The prevalent vegetation was, as usual, greasewood with salt bushes now and then. Low sand dunes were visible here and there.

The Pimas of Kohatk I found to be good-tempered, affable people. The women cut their hair in front so as to have bangs and they are good-looking. These natives seem to be somewhat under Roman Catholic influence and have abandoned their native feasts. Photographing was as much detested here as elsewhere. The sight of my camera would make the children take to the woods and the old men hurriedly disappear on hands and knees into their dome-shaped huts.

I heard neither English nor Spanish spoken, but the inhabitants have adopted the frontier man's way of living, frying their meat in lard and adding quantities of it to their beans. They buy white flour and make unwholesome tortillas in boiling lard. This heavy, poorly cooked food forms their daily regime, without any variety. A small bucketful of coffee is distributed at meal-time both in the middle of the day and in the evening. They possess cattle but, like most white ranchers, are too lazy to milk the cows. The meals are appropriately served on plates of cheap crockery and cups bought in the white man's stores. The participants give audible evidence of consuming more lard than is good for them, and, were the facts known, "to be as dyspeptic as a civilized Indian" would be an adage. Think of the anomaly of leaving wholesome, natural, well-cooked dishes for a diet of lard and the cheapest kinds of canned goods.

Contrary to the universally accepted opinion, the cui-

7: Lumholtz N-5 (1909-1910) 1912
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only more shallow. On the rocks were pictographs of the same kind and design as may be seen elsewhere in the district, as, for instance, near Caborca. Turkey vultures have a breeding place on the top; according to my guide, who has seen the young here, these birds make no nests.

Inside of the houses of the Indians in these parts, I often noticed skins of the peccary, called in Mexico *javalin*, the meat of which is much relished by the Papagoes; also skins of the mountain-sheep, deer, and lynx were seen. The Papagoes are exceedingly fond of meat. One day at La Nariz a young steer was killed. Generous parts of the carcass were distributed to those who had helped to butcher it, and everybody in the afternoon, including ourselves, was invited to come and "eat meat." The meat was broiled on coals, each person preparing his portion for himself, and this feasting was kept up until eleven o'clock that night. The participants actually arose earlier than usual, long before sunrise, to broil more meat and continue the banquet. Nothing else was consumed, not even tortillas, and in the afternoon very little of the beast was left.

At the so-called Temporales, where Mexicans from Sonoita and Quitovac practise dry farming, besides the usual forms of Indian corn, a kind of maize that matures in about two months is cultivated. It is called *maiz de los Yumas*, is white in color, and the ears are small. I saw some that had been planted in the beginning of August and which was ripe by the middle of October. The rains rarely fall here before August. Frost usually appears the 1st or 2d of November. This year it came on November

7: Lumholtz N-5 (1909-1910) 1912
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cave, and he had made several improvements in the ar- 778
rangement of some. As the time drew near for our ex- 782
cursion, I felt little inclined for the vigil of one night which had been agreed to, so I asked him if a couple of hours' devotional exercise might not be sufficient for our needs. Clemente and Guadalupe, though perfectly willing to comply with the conditions, confessed that they did not know any Pinacate songs. By this and similar arguments we succeeded in changing the old man's mind, and he delighted me when after thoughtful reflection he declared that it was not necessary to sing now that we had so many sacrificial things.

I had decided to take Monday, January 3, for the visit, 778
combining with it an ascent of the one of the two peaks which was nearer to our camp. In the morning the wind changed to west and north-west; a chilly, light shower of rain fell, but when we started from the tinajas for the ascent at 10.40, the weather was clear, there being only a few nimbus clouds in sight. As we followed the fairly distinct Indian trail that winds its way along the ridges upward, I observed the chuparosa (*beloperone californica*), [262] [824] the flowers of which are eaten by the Papago, and also quantities of the well-known plant chia in the small arroyos and declivities. One hour's march brought us to the base of the cinder-covered cone where the cave was situated. Many years had gone by from the time of Queléle's last visit to the sacred precinct; his hair was not gray then and more than one generation had passed since. He could not at once find the object of our trip and half an hour was spent in searching for it in the lava flow.

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

844 she takes up her abode in the hohólikaki where she remains for over three weeks. She bears her child *accroupie* assisted by her mother or elder sister; sometimes an elderly woman is specially chosen for this, acting as
846 midwife. Formerly, for six days thereafter, the food was
[262] made for the mother and brought to her, the diet for the first two days consisting of *atole blanco*, a kind of thin gruel made of maize or sometimes wheat, mixed with the seeds of the sahuaro fruit. Now, in imitation of Mexican custom, the period is extended to twenty days. The husband during this time uses a different gourd from the rest of the family when he drinks water.

553 Twenty days after the wife has returned from her
261 seclusion the medicine-man comes to the house to give the baby clay to eat and present it with a name. The clay has the same name, *pit*, as that used in pottery making, and it does not look in anywise different. In the afternoon, after having mixed a small quantity with water and placed the mixture in a sea-shell on the ground, he takes up a position east of it, while the parents, with the infant, stand to the west. He walks four times toward them, the last time hooting low like an owl. The parents have to take the drink first, then the baby. If the child is male, the medicine-man gives it to the mother first; if it is female the father drinks first. In administering the drink to the child, he also gives it a name, which the grandparents previously have agreed upon; with his eagle plumes he makes passes over the infant, and with the same object sprinkles some of the water on its chest, shoulders, and back. The advan-

8: Pijoan, Elkin & Eslinger D-5 (ca. 1942)1943
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ASCORBIC ACID DEFICIENCY AMONG PAPAGO INDIANS

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INTRODUCTION

The Papago Indians, a people of Uto-Aztec origin, live in sequestered communities, among reservation lands of approximately 2,500,000 acres. These settlements extend along the frontier of Arizona and Sonora and are bordered by the Pima reservation on the north. The land itself is typically that of an Arizona desert, with vegetation of cactus, palo verde, mesquite and ironwood; it is an arid, forbidding, isolated region with very low precipitation.

The Papagos, over five thousand in number, pursue their temporal farming, much as they have always done, but in many instances a deculturation process has taken place with a change from a diet of wild plants and animals to one of more or less refined cereals and occasionally meat. The fact that the bean is the staple food of the Papagos is borne out by the name given to these Indians, "papawi o' otam," meaning "bean people."

The principal foods in the Papago diet are beans of several varieties: white, brown and yellow tepari (Phaseolus acutifolius), pink beans (Prosopis vulgaris), mesquite beans (Prosopis chilensis), and screw beans (Prosopis pubescens); garden peas (Pisum sativum), and black-eyed beans (Vigna sinensis), corn (Zea mays, amylacea), pumpkins (Cucurbita

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8: Pijoan, Elkin & Eslinger D-5 (ca. 1942)1943
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pepo; Cucurbita moschata), dried chili (Capsicum annuum), a native spinach or pigweed (Ameranthus Palmeri), and whole wheat and peeled wheat (Tricitum vulgare). The majority of these foods are dried for storage.

The Papagos utilize for consumption the available varieties of cactus as they did aboriginally, gathering the fruits of the cholla (Opuntia echinocarpa) and various other kinds of prickly pear (Opuntia spp.) and the sahuaro (Carnegiea gigantea). The fruits are eaten in large quantities during season and in most instances these are baked for 24 hours in pits partially filled with hot stones; the surplus is dried for storage. The sahuaro fruit is often prepared as a syrup or jam. The seeds of the cactus are dried and later these are ground into a meal from which they prepare a gruel. In most of their cooking the Papagos use quantities of fat, especially lard or vegetable shortening.

In general it can be said that the diet of these people is one rich in cooked carbohydrate, with occasional animal protein and, in rare instances, cooked green fruits or vegetables. The Papagos drink but little milk (except from the breast during infancy); most of the natives in the outlying districts drink no dairy milk at all. As a result of their diet numerous avitaminoses occur, superimposed one on the other; the deficiencies may be subclinical or threshold in character due to a continued shortage of vitamins in the diet.

ASCORBIC ACID STUDIES

Various studies in the literature indicate that the ascorbic acid content of the plasma and the amount excreted are an index of the previous dietary intake (Bêlser, Hauck and Storvick, '39; Heinemann, '38). On the other hand, reports have appeared where the blood analyses themselves are used to determine the actual state of ascorbic acid nutrition (Minot, Dodd, Keller and Frank, '40). In some instances the blood and urine analyses have been supplemented by the determination of ascorbic acid in the dietary intake (Todhunter and Robbins, '40: Goldsmith, Ogaard and Gowe, '41). However, as Bessey and White ('42) have pointed out, the practical problem is one

8: Pijoan, Elkin & Eslinger D-5 (ca. 1942)1943
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146 In view of the fact that a plasma level of 0.8 to 1.0 mg. per cent appears to be the normal range for medical students (Pijoan and Klenperer, '37), the values expressed in the foregoing paragraph are low enough to indicate a continued shortage of this vitamin in the diet. Furthermore, the subjects studied were those in whom no wasting or progressive debilitating disease could be found. In short, it would appear that these subjects were good candidates for the study of vitamin C nutrition.

146 In the Papago village of Cowlic, the diet is low in ascorbic 262 acid. It consists predominately of beans and home-made bread together with meat occasionally (possibly once a week, and used as a seasoning), and occasionally cooked pumpkins and cactus fruits.

146 No ascorbic acid was found in our assays of all of the various types of uncooked and cooked beans, corn, peas and dried cactus seeds. The only sources of ascorbic acid we are aware of in the Papago diet are as follows (in milligram per 100 gm.): Sahuaro cactus fruit 3.52; dried red chile 14.46; dried cactus buds (cholla) 1.48; spinach (pigweed) 3.72; wheat flour 2.7; and squash 2.75. Since most of these foods are consumed after they have been cooked, and since no "cooking time" (by boiling) was less than 20 minutes on the part of the natives, the same foods (2-gm. samples in 15 cc. water) were subjected to boiling (97°C., alt. 5600 feet) for 20 minutes. The ascorbic acid content in milligram per cent weight plus that in the water used for cooking was as follows: Sahuaro cactus fruit 1.76 mg., dried red chili 9.57 mg., dried cactus buds 1.16 mg., spinach (pigweed) 1.32 mg., wheat flour 1.5 mg., and squash 1.2 mg. Other foods consumed contained values as follows: bread 1.7 mg., and Sahuaro cactus fruit syrup 8.96 mg.

In a diet consisting essentially of cooked carbohydrate, where chili and other ascorbic acid-containing foods are only incidental, the ascorbic acid content never exceeds 15 mg. a day and is, generally speaking, on an average of about 5 mg. a day. Bleeding of the gums occurs in 70% of the Indians, [164] and pyorrhoea is present in all the older adults examined.

11: Hoover U-4, 5 (ca. 1930) 1935
NU28 Papago NU28

coyotes, and decayed vegetables.[14] Settled again from Tecolote, Poso Verde, situated in a semicircle of foot hills, is now one of the most pleasing of all the Papago villages.

The "trincheras" or walled fortifications on the isolated mesa four miles east of San Miguel were built by the Papago as a retreat in case of Apache raids. They are in this respect distinct from the prehistoric trincheras on the mount just south of Sells, near Poso Verde, and through the Altar Valley, described by Sauer and Brand.[15]

The most important factor in making new and smaller settlements desirable has been the introduction of cattle, dating from the journeys of Father Estubio Kino, 1691–1702, followed by those of Father Garcés, 1768–1775. Along with Christianity, Father Kino introduced cattle, horses, and chickens. Cattle did not become important with the Papago, however, until the latter part of the nineteenth century, and the extensive areas between their limited fields were of little use to them except as game preserves. By hunting and gathering in these areas, they supplemented the produce of their fields, but no inducement was offered to permanent settlement of these areas. In 1849–1850 John Audobon described the Papago as fast passing away, judging from the dilapidation of the towns and the number of empty houses.

> The people live on turtles and what game they can get. I have seen small elk and antelope skins dressed and terrapin shells are everywhere. We have bought two terrapins fresh killed, some roots, and the fruit of a plant called the manguey.
>
> Why it is that these Indians settle in such a country, I cannot conceive, for even the lizards, in most places innumerable, are scarce here. The Indians kill them with a light wand, giving them a dextrous tap on the head. They pick up the game, slip the head under a belt or string round their waists, and when sufficient are collected, a little fire is made, and this delicate repast is enjoyed by them as an epicure would relish his brace of woodcock.[16]

Audobon also described a sort of mush made of grasshoppers. The insects were caught and dried, then pounded and mixed with meal or pinole, parched wheat or corn, spiced and pounded.

Pastoralism is better suited to a scattered population, so the tendency has been for the larger villages to break up into more scattered settlements. The passing of the old Tecolote village in favor of smaller communi-

[14] J. Ross Browne, Adventures in the Apache Country (New York, 1874), p. 277.

[15] Carl Sauer and Donald Brand, Prehistoric Settlements of Sonora, with Special Reference to Cerros de Trincheras (University of California Publications in Geography, Vol. 5, No. 3, 1931), espc. pp. 67–70.

[16] Audobon's Western Journal, 1849–50 (Cleveland, 1906), pp. 148–50.

222 only a day the women went alone; if it were a longer trip, whole families went. The younger women and boys fetched water daily, the men hunted and at times helped in the picking. In such cases the regular community life was transferred to the camp.

251 The picking of a crop almost always entailed measures for storage, both to keep it from spoiling and to lighten the load on the return trip. The fresh product could be eaten only by those who were in the camping party since the hot sun would shrivel it within a few hours after picking; therefore, part of the gathering technique was the roasting, boiling, or winnowing of the product.

Greens

222 Small succulent plants:
262 *mo'otari (Franseria tenuifolia)* stalks, Summer
Lambsquarter, *hiwitcuis (Chenopodium murale)* stalks, Summer
Pigweed, *tcuhukia (Amaranthus palmeri)* leaves, July, August
Lambsquarter, *tcu'ari (Chenopodium* sp.) leaves, July, August
Cañaigre *(Rumex hymenosepalus)* leaves, Spring
Dandelion *(Taraxacum officinale)* leaves cooked or uncooked
Saltbush *(Atriplex wrightii)* branches, Summer

Larger, coarser plants:
Cane cactus, cholla, *wipinoi (Opuntia arborescens)* Summer
Jumping cholla, *ha:nam (Opuntia fulgida)* young shoots and buds, Summer
Many-colored tree cholla *(Opuntia versicolor)* young shoots and buds, Summer
Cholla, *tci'orim (Opuntia echinocarpa)* buds, May
Prickly pear cactus, *nohwi (Opuntia engelmannii)* leaves with thorns scraped off, sliced in strips, Summer
Mescal, American aloe, century plant, *a'o'ṭ (Agave americana)* crown with leaves removed, Winter; central flowering stalk before it emerges, Spring
Sotol, *umu'k (Dasylirion wheeleri)* crown with leaves removed; central flowering stalk before it emerges, May
Fishhook cactus, barrel cactus, *viznaga, tciaur (Echinocactus wislizeni)* pulp, May
Night-blooming cereus, reina de noche, *ho'o'k iva (Cereus greggii)* stalks

17:Castetter & Underhill N.E-5 (1931-1934) 1935
NU28 Papago NU28

Another occasional food, or more accurately a drink, is the pulp of the *viznaga*, barrel or niggerhead cactus *(Echinocactus wislizeni)*. If one becomes thirsty on a journey he cuts the top off a plant with a sharp stone, pounds the pulp and scoops out the juice with the half gourd *(Lagenaria vulgaris)* which he carries as a drinking and eating vessel.

According to Thackery and Leding (25), the fruits of the viznaga are cut up and cooked with cornmeal or other material, the seeds being discarded.

Root, Tuber, and Bulk Crops

Sand-root, *caa'ṭ (Ammobroma sonorae)* October
Wild potato, *taiaroti.* A climbing species of *Solanum.* Summer
mo'otari (Franseria tenuifolia) Summer
Wild onion, *sipuia* (Span.) *(Allium unifolium)* May
Papago Blue Bells, Covena, *ha'at (Brodiaea capitata* var. *pauciflora)* April
Night-blooming cereus, *ho'o'k iva (Cereus greggii)*

The staple root crops are the sand-root *(Ammobroma sonorae)* and the root of *Franseria tenuifolia*, both of which appear on the flood plains near the villages after the rains. Whole families go out with digging sticks usually in October to gather the roots of these species, and live upon them while they last. Any surplus is sun-dried on the house-roofs and stored in jars.

The sand-root has been used from time immemorial by the Papago and is parasitic upon the roots of the small desert shrubs *Coldenia plicata* and *C. Palmeri*, as well as on *Eriogonum deserticolum.* It is to be found in parts of the Southwest where the average rainfall is between only two and five inches, and is eagerly sought by the Papagos, who consider it a most excellent food; it is eaten either raw or roasted (6, 17, 24).

Palmer (20) records that these people dried and ground the stems of the sand-root with mesquite beans *(Prosopis*

velutina) to make a pinole,[1] and discusses its general use and preparation, while Havard (14) also refers to its use by the Papago.

Similarly the tubers of the climbing potato (a species of *Solanum*) and the roots of the wild onion *(Allium unifolium)* which grow only on Mt. Baboquivari, were collected in May and mid-summer, respectively. These two plants were brought back by hunters, or by individuals who made the long special journey to obtain them to trade for baskets, skins or pottery. The bulbs of Papago Blue Bells are eaten raw. They do not have a pleasing taste and are eaten largely because they appear in early spring, before other crops are ready.

The large root of the night-blooming Cereus *(Cereus greggii)* which may weigh as much as four pounds is chewed raw for thirst or may be baked whole in ashes, peeled and eaten.

Fruits[2]

Small fruits:

u:spa't (Condolis spathulata) Summer
Mulberry, *kohi (Morus microphylla)* Summer
Hackberry, *kom (Celtis reticulata)* Summer
Boxthorn, *kuawur (Lycium fremontii)* August
Mistletoe, *hakowa't (Phoradendron californicum)* Summer
Lote bush, *u:s teui'tpa't (Zizyphus lycioides)* Summer
Bird Cayenne pepper, *tcirtipin (Capsicum frutescens* var. *baccatum)* August
Black oak, *toa (Quercus emoryi*, also *Quercus oblongifolia)* July
Bucknut, coffee berry, quinine plant, *hohwi (Simmondsia californica)* August

Cactus and Yucca fruits:

Giant cactus, sahuaro, *ha:canyi (Carnegia gigantea)* July
Organ pipe cactus, pitahaya, *tcutcuis (Lemaireocereus thurberi)* August

1. The Papagos mean, by pinole, a gruel made of parched, ground cornmeal and water. Since the meal has been parched before the water is added, no cooking is necessary. Pinole was the only ration used on journeys, since it served both for food and drink. It was also the prescribed food during ceremonial purification.

2. The term fruit is here used in the botanical sense and thus covers berries, nuts, etc

17 Castetter & Underhill N.E-5 (1931-1934) 1935
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Prickly pear cactus, *nohwi (Opuntia engelmannii)* June, October
Cholla *(Opuntia fulgida)* August
Cholla, *tci'orim (Opuntia echinocarpa)* August
Soapweed, datil, *hoi (Yucca baccata)* (fruit *howitc*) Summer

Of the small fruits, *Condolis spathulata* is eaten only raw and not thought worth preserving. If hackberries *(Celtis reticulata)* or mulberries *(Morus microphylla)* are found near the village, carrying baskets are filled with whole branches of them by the women. Clusters of mistletoe *(Phoradendron californicum)*, which often grows on the mesquite bush *(Prosopis velutina)*, are gathered, their branches laid on mats, dried and the berries rolled free. These berries form a sticky mass which is further sun-dried and stored. The somewhat larger boxthorn berries *(Lycium fremontii)* are picked, dried and eaten like raisins. Only the fruit of the lote bush *(Zizyphus lycioides)* is cooked, and this is boiled to a syrup like the cactus fruits.

These people now use as seasoning the very pungent bird Cayenne pepper or spur pepper *(Capsicum frutescens* var. *baccatum)* which grows in the Baboquivari Mountains and apparently nowhere else in the state. This plant may have been introduced by the Papagos and is very much used by them in their daily life as a condiment on the table or for cooking with beans or other foods. It is this species that is cultivated farther south for the hot peppers. As one drives over the Papago Reservation and stops at trading posts he invariably finds dishes of these small, dry, red, extremely pungent berries offered for sale. These always find ready buyers among the Papagos and Mexicans.

Acorns *(Quercus emoryi)* ripen in July a little later than the giant cactus fruit, but grow in only a few hilly places, mostly at the south of the Papago territory, and are gathered on a long camping excursion similar to that for the sahuaro fruit. For the most part acorns are eaten fresh from the shell. Bucknuts *(Simmondsia californica)* are similarly eaten though not in quantity. Russell (22)

17:Castetter & Underhill N,E-5 (1981-1934) 1935
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Seeds [3]

342 Sacaton, *ohki (Sporobolus wrightii)* September
222 Peppergrass, *ka:cowani (Lepidium thurberi)* September
opom (Monolepis nuttalliana) September
Pigweed, amaranth, *tcuhukia (Amaranthus palmeri)* September
Tansy mustard, *cu'uwa't (Sophia pinnata)* September
Mesquite, *kui (Prosopis velutina)* August
Little leaf horse bean, palo verde, *ku'k tciata'k (Parkinsonia microphylla)* August
Jerusalem thorn, bagote, palo verde *(Parkinsonia aculeata)* August
Ironwood, palo de hierro, *hoitkam (Olneya tesota)* August
Devil Claw, unicorn plant, *ihu'k (Martynia fragrans)*

222 The species of grass seed which ripen in September and October around the villages are collected and winnowed. One informant said "We would work all day and feel as though we had done so much and there would be about a cupful." One method of winnowing is to pull up whole plants, lay them on a fiber mat and beat out the seeds with a stick. Another method, which is used with a very light grass, sacaton *(Sporobolus wrightii)*, is to burn the whole patch, then sweep the seeds off the ground. With *Monolepis nuttalliana*, the seeds of which are difficult to remove, the method consists in boiling the stems, then collecting the seeds from the bottom of the pot. The seeds of Amaranth or pigweed *(Amaranthus palmeri)*, so important among the Aztecs, are also collected and utilized as an important source of food. The most common of the seed crops, however, is tansy mustard *(Sophia pinnata)*.

251 The technique for storage of all seeds is basket-winnowing, parching and sun-drying. This winnowing is the same as that practiced by the Pimas and many of the Yumans, and consists in shaking the seeds horizontally in a flat basket, now and then jogging the basket so that the chaff is brought to its upper edge to be taken off by the wind. Seeds are never stored without cooking for fear of mildew. While parching they are placed in a flat basket with a few

3. Botanically some of these are fruits.

17:Castetter & Underhill N,E-5 (1931-1934) 1935
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241 hoe. This was a sword-shaped slab of mesquite *(Prosopis velutina)* about two feet long, sharpened on the lower edge.

Crops were harvested in October, giving a growing season of about one hundred days. After being flailed or winnowed, then thoroughly dehydrated on the roof of the house, they were stored in jars or baskets. The Papagos usually hid their food for safe-keeping.

LEGUMES

262 Tepary, *pawi (Phaseolus acutifolius* var. *latifolius)*
241 Kidney bean, *mu:nyi (Phaseolus vulgaris)*
Vetch *(Vicia sativa)*
Lentil *(Lens esculenta)*
Chick pea, garabanzo *(Cicer arietinum)*

241 Freeman (11), who has made a careful study of the beans and teparies of the Southwest, collected two different types of beans from the Indians of southern Arizona. They were recognized by the Indians as distinct, and are commonly known by the names, "Frijoles" and "Teparies." Frijoles belong to the group of common kidney beans *(Phaseolus vulgaris)*, while teparies belong to that large and variable species, *Phaseolus acutifolius.*

The native tepary, *pawi*, a staple crop of the Papagos and from which they received their nickname *papawi o'otam* (bean people), was grown by Indians of southern Arizona and Sonora and as far west as the Cocopa Indians (13), but its name comes from a Spanish pronunciation of the Papago phrase *ṭ pawi* (it is a bean). The Spaniards found the Papago growing this crop in 1699 (18), and their later reports refer to it as "the small native bean called tepary" (27). The Papagos cultivate at present as many as fifteen varieties of tepary, represented chiefly by different colors (11). However, the one found most valuable for cultivation and for cooking purposes is the white tepary, which grows both as a bush plant and as a climber.

241 Varieties of tepary have been found growing wild in 174 western Texas and New Mexico, also in Sonora, and it must have been cultivated at an early period since a specimen of

17:Castetter & Underhill N,E-5 (1931-1934) 1935
NU28 Papago NU28

241 174 "At least one variety of the common kidney bean, pole bean, bunch bean, etc., was known to the natives before the advent of the Spaniards."

241 Teparies and frijoles are still planted at the beginning of the rainy season in holes three feet apart and six inches deep. When harvested the vines are laid on the ground and the beans threshed out with a stick; or if a very large crop, [251] it may be threshed with horses, as is wheat. The threshed beans are dried on the ground or roof and stored in jars. Vetch *(Vicia* sp.), lentils *(Lens esculenta)* and chick peas or garabanzos *(Cicer arietinum)*, all of which have been introduced, are planted in February with the wheat and harvested like wheat in May, but otherwise are treated like beans.

CORN *(Zea mays)*

[262] 241 Red corn ---------- *si-wihpiki huhnyi*
White corn ---------- *to:ta huhnyi*
1. large grains
2. small grains

Yellow corn ---------- *s'uam huhnyi*
1. small, irregular grains, like popcorn
2. large grains, soft
3. a modern variety, attributed to the Navajo

Blue corn ---------- *s'tciata'ki huhnyi*
1. small, regular grains
2. large, irregular grains *(ku:pi)*

Crazy corn, grains of all colors ---------- *tcihpawi huhnyi*

Laughing corn, mixed red and white, large grains ---- *hihihmi huhnyi*

All these varieties are mentioned in Papago planting songs but at present the only ones commonly found are yellow and white. Gifford (13) mentions both a yellow and white and a white soft maize, also a flint maize, grown by the Cocopa under the Papago name of *huhnyi* (corn) and credited to the Papagos.

The different colored corn grains were stored and planted separately and never allowed to mix. When har- [251] vested the grains might be removed from the cob with a

17:Castetter & Underhill N.E-5 (1931-1934) 1935
NU28 Papago NU28

CUCURBITS

[262] **Pumpkin, *hahri (Cucurbita pepo)***
Cushaw, Crookneck pumpkin, *caskatc'ki (Cucurbita moschata)*
Muskmelon, *uuwi hahri (Cucumis melo)*
Watermelon, *kĭhpi (Citrullus citrullus)*

Both *Cucurbita pepo* and *C. moschata* are commonly regarded as aboriginal species among the Papagos, although this has not been definitely established. The Spanish records refer to the Pima-Papago people as growing *calabasas* (10, 18), a word which was used quite loosely in old Spanish writings to denote pumpkins, squashes, or melons. Mange (18), in 1697, spoke of *melones* (probably muskmelons) and *sandias* (watermelons) as growing on the Gila and it is quite possible that these were grown from seed given by Kino, since this was ten years after his arrival. Other authorities state that watermelons were given the Indians by the Spaniards (27). Pumpkins were planted in the rainy season with an invocation like corn. When harvested [251] the rind was peeled off in a long spiral which was hung from the house roof to dry, after which it was tied into bundles and stored in jars. Muskmelons and watermelons are grown at only a few places, such as San Xavier, where there is plenty of water. No attempt is made to store them.

TOBACCO

[276] 249 **Coyote tobacco, *wiupuri (Nicotiana trigonophylla)***
Yaqui tobacco, *wiiw (Nicotiana tabacum)*

The first species used was the native *Nicotiana trigonophylla*, which grows wild on Elder Brother's mountain and is still used to some extent. In addition to this the Papagos and Pimas, at least fifty years ago, were cultivating the common tobacco *(N. tabacum)*. Seeds of this Yaqui tobacco, as the Papagos called it, were probably traded from Mexico. These seeds, in the possession of old men who did [431 435] the tobacco raising, were considered very valuable and sometimes given as gifts.

17:Castetter & Underhill N.E-5 (1931-1934) 1935
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Tobacco was planted in March and the planter would choose a place at the mouth of a small wash, out of sight of all the other fields, for tobacco had to be grown in secret. As soon as the plants were up creosote bush branches *(Covillea glutinosa)* were stuck in the ground to shade them. No one but the planter must now visit the patch or the plants would become shy and sink into the earth again. If a menstruating woman were to see them they would shrivel up and die.

No hoeing or transplanting was done but merely earth heaped around the roots now and then. A fence of mesquite posts *(Prosopis veluntina)* with thorny cholla cactus *(Opuntia* sp.) between protected them from marauding animals, and a ditch dug from the wash to the patch conducted any possible rain water. The creosote bush shelter was left until the plants grew up and touched it. When the tobacco was ripe the leaves were pinched off and spread on a mat outside the house to dry, although they were considered ready for smoking when about half dried, still green and very bitter.

COTTON

Cotton, *to'ki (Gossypium* sp.)

The early Spanish accounts refer to cotton as being grown, not only by the Gila Pimas (10), but by the Sobaipuris on the San Pedro (27) and by the people of San Xavier (10) (who were not the present residents). Little mention is made of the growing of cotton by the desert people, but informants thought a little was grown in favored places. No particulars of its culture were obtained. Cottonseed flour made very good browned cakes when baked on hot sand.

WHEAT

Wheat, *pi:rkanyi (Triticum aestivum)*

Wheat seeds were given away profusely by Kino at the end of the seventeenth century. Most Papagos, however, say they did not take over its general use until two or three

HUNTING AND UTILIZATION OF WILD ANIMALS AS FOOD

LARGE GAME

262 Mule or black-tailed deer, *huavi* ---------- *(Odocoileus hemionus)*
Arizona white-tailed deer, *siiki* ---------- *(Odocoileus couesi)*
Antelope, *kuvi't* ---------- *(Antilocapra americana)*
Mountain sheep, *tcicinyi* ---------- *(Ovis mexicanus)*
Peccary ---------- *(Pecari angulatus)*

224 The mule or black-tailed deer is the game animal around which Papago ceremonies center; it was abundant over the whole country before grazing became extensive, and is still to be found on Mt. Baboquivari and in the uplands just across the border.

Deer hunting was a profession engaged in by only a few. These men bore the title of Headbearer and spent their winters in laying up a supply of skins, sinew and fat, which they traded at times as far as the Gila and Altar valleys. They were also often skilled workers in hides. Deer hunters usually wore a deer head disguise, although a few depended entirely upon clever stalking.

The disguise was made by cutting off a deer head at the neck and removing the skin from the skull with a flint knife, reaching up through the neck and through the mouth, widened for the purpose. The skull was finally pulled out through the mouth which was then sewed up to proper size. Grass was stuffed into the skin to keep the shape while being sun-dried. Next the antlers were shortened from the base and fastened into the head, and the eye openings were either sewed up or fitted with pebbles. After this 224 a loop of flexible catclaw *(Acacia greggii)* was fitted around the hunter's forehead and the skin of the deer neck sewed to this, so it would dry the right size to fit the hunter's head. Thus prepared, the stuffed head was dried in the sun until the skin was hard and stiff.

17 Cameron & Underhill N.E-5 (1931-1934) 1935
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SMALL GAME

262 Black-tailed jackrabbit, *teu'k teu:wi* ---------- *(Lepus californicus)*
White-tailed jackrabbit, *s'toa teu:wi* ---------- *(Lepus alleni)*
Cottontail rabbit, *to:pi* ---------- *(Lepus arizonae)*
Packrat, *ko:son* ---------- *(Neotama albigula)*
Round-tailed ground squirrel *ci:ri'k* ---------- *(Citellus tereticandus)*
Merriam pocket mouse, *naha'kio* ---------- *(Perognatus spinatus)*
Kangaroo rat, *tahiwua* ---------- *(Dipodops sp.)*
Gambel quail, *kakaitcu* ---------- *(Lophortyx gambelii)*
Mourning dove ---------- *(Zenaidura macroura)*

224 The Papagos differed from their neighbors in that their procedure with these small animals was to shoot them with [HT] bow and arrow, rather than to trap or club them. For the purpose they used arrows of creosote bush wood *(Covillea glutinosa)* with a wooden tip hardened in the fire.

[261] The Papagos considered cottontail meat sweet and jackrabbit poor. However, jackrabbit was the one meat available at all seasons, though in spring the animals were so thin as to be almost useless.

Rabbit shooting was usually done by the boys. The one exception was the rabbit hunt held in recent times just before the drinking ceremony. For this there was a regular director who also functioned in games. The Papago hunt differed from the Pueblo practice in that no stick was used and women did not take part.

The hunt took place in spring. All the men and boys engaged formed a circle about two miles in diameter with a line of the best bowman at one point. These men remained stationary while the circle converged and drove the rabbits toward them. All the killing was done with bow and arrow.

Rats and squirrels were hunted systematically at their holes. The packrat, largest of the group, was a very common food, and as it builds its nest surrounded with thorny cholla joints *(Opuntia sp.)*, the process was to scare it out. Ground squirrels were smaller and less desirable, while pocket mice were too small but were eaten in "the hungry time." The kangaroo rat was a last resource.

17:Castetter & Underhill N,E-5 (1931-1934) 1935
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Gambel quail was the most important food bird. It was trapped in a very rough cage of split giant cactus ribs *(Carnegia gigantea)*. Mourning doves might also be caught in it though these were usually shot with arrows when they were roosting at dusk; they are still hunted and used as food. No bird eggs were ever used.

REPTILES AND WORMS

The desert tortoise *(Gopherus agassizii)*, known as *komaktcï't*, was not hunted but people seeing one would take it home and cook it for food.

The worms used were, when young, about an inch long and yellow, but they matured in a few days and turned green. They appeared in quantities just after or during the rainy season on any green growth, especially the amaranth *(Amaranthus palmeri)*. Everyone dropped work to gather them, for they were considered a great delicacy.

DOMESTICATED ANIMALS

The Papago pets in the old days were dogs *(Canis familiaris)* and a few species of birds. Dogs were used to guard the houses, rarely for hunting. The breed was a small white one, in build like a coyote *(Canis lestes)* but with softer fur and only half the size. Coyotes were kept as pets if captured young.

Arrow feathers were obtained from a species of hawk *(Accipiter* sp.), and these were housed in wicker cages and fed with rats and lizards. The tail feathers were pulled whenever they grew long enough. Spanish accounts speak of a number of macaws *(Ara* sp.) being kept for their feathers at San Xavier (27), but this being before Papago occupancy there is no tradition of it.

Father Kino (3) at the beginning of the eighteenth century distributed droves of horses *(Equus caballus)*, cattle *(Bos taurus)*, sheep *(Ovis aries)*, and goats *(Capra hircus)* to all his missions and to many villages where he hoped to establish missions later.

FOOD PREPARATION

The Papago diet consisted ordinarily of dried foods: cereals, dehydrated vegetables, and sun-dried meat. Fresh foods were available for only short periods, when they were consumed in quantity.

The year round staple was flour, made from corn; the beans of mesquite *(Prosopis velutina)*, ironwood *(Olneya tesota)*, or palo verde *(Parkinsonia microphylla)*; pumpkin seeds *(Cucurbita pepo)*, dried yucca fruits *(Yucca* sp.*)*, sahuaro *(Carnegia gigantea)* and various other wild seeds. The technique with all these except the sticky mesquite was to parch, sun-dry, and store in sealed jars. The parching was done at the time of gathering and was really part of the storage technique to prevent mildew, although the seeds were not ground into flour until just before they were used. The mesquite beans, too sticky for a metate, were pounded in a mortar made either of stone or wood (a mesquite log hollowed with a stone axe). Women who went to gather the fruit of the Spanish Bayonet *(Yucca elata)* often pounded it to a pulp in hollows of the rocks.

Flour was used most often in the form of a gruel. There were two kinds: *waka*, the Mexican pinole, which served warriors and people on journeys with both food and drink, was made by simply mixing parched corn flour with water. *Ator*, the gruel served at home on non-ceremonial occasions, was made by boiling the flour with water and salt. The pot in which it was cooked was rarely empty, and for a meal a little more flour of any kind was added, and the whole cooked. Thus all sorts of combinations were possible, the favorite being cornmeal with sahuaro seed flour *(Carnegia gigantea)*, which was slightly oily and sweet.

Mesquite flour, unlike other flours, was made at the time the beans were harvested. The housewife ground parched seeds and made the flour into a compact cake. This was sprinkled frequently with water for several days until

17:Castetter & Underhill N,E-5 (1931-1934) 1935
NU28 Papago NU28

it hardened into a lump, called the "mesquite turtle," and pieces could be broken off and eaten just as they were.

Breadstuffs were used much less often than gruel. The most common was the tortilla made of cornmeal and water. Flattened balls of this dough were quickly cooked on a heated pottery griddle; or they might be baked in the ashes of the hearth, thus making a sort of ash bread. Among the Papagos of Sonora, however, wheat flour tortillas were and still are dominant. Cottonseed flour *(Gossypium* sp.) and sahuaro seed flour which are oily, made very good browned cakes when baked on sand heated under hot stones.

Gruel or bread was the basis of every meal and the usual addition was boiled dehydrated vegetables. All greens like aloe *(Agave americana)* and cholla joints *(Opuntia* sp.) had been pit-baked before storing, while root crops and the cultivated squash and beans had been simply sun-dried. All of these were taken from the storage jars and soaked both to freshen them and to remove dirt, then boiled with water and salt. A favorite dish was a form of succotash, made of dried teparies and corn grains.

Fresh greens like amaranth *(Amaranthus palmeri)* and fresh squash were also boiled, but, since water was scarce, anything that was juicy enough was roasted. This was the treatment for the flower stalks of aloe and sotol *(Dasylirion wheeleri)*, the joints of cholla, cañaigre greens *(Rumex hymenosepalus)*, and squash. Ashes were raked out of the fire and the vegetables buried in them. In a period of marked water shortage dehydrated vegetables also could be treated in this way after the first soaking.

The sweets, highly prized, were dried fruits, fruit jam, fruit syrup, and honey. Sahuaro *(Carnegia gigantea)*, pitahaya *(Lemaireocereus thurberi)*, and prickly pear *(Opuntia* sp.) fruits could be dried and stored in jars, but not for long because they became wormy. Syrup and jam from all these fruits were made when they were picked. The flowers of mesquite *(Prosopis velutina)*, ironwood *(Olneya tesota)*, and species of yucca have a good deal of nectar. These

aridity, and the replacement of grass by mesquite, shrubs, and cactus, the distribution and abundance of grass is closely controlled by precipitation, with most of the growth taking place each year in August. In general, the best grassland is at the higher elevations of the reservation (excepting the rougher summits of the mountains and ridges), that is, on the slopes of the Baboquivari Mountains and in other scattered locations where precipitation is favorable. In this connection it is of interest that Richard J. Hinton described the country for 38 miles west of the Baboquivari Mountains as "fine grazing land" in 1878 (The Handbook to Arizona), whereas the grass got progressively poorer as he travelled further west.

A large number of the common desert plants were traditionally used by the Papago, particularly as food, and also as the materials of which houses, baskets, and numerous tools and utensils were constructed. Particularly important were the fruits of the sahuaro and mesquite and seeds of sacaton grass, and pigweed or amaranth. From spring through late summer, many plants were valued as greens, contributing importantly to the diet: lambsquarter, cannigre, the buds of the cholla, the mescal or century plant, sotol, and others.

[Arizona Labor Camps]

751
825 In visiting labor camps in the course of this study, the writer saw Papago babies lying on the ground on a blanket in the shade of a camp cabin with flies in [854] clusters at their eyes and nostrils while the mother went about her work. Papago women were seen cooking [252] with flies buzzing freely around, and the daily pot [262] of frijoles often sat on a spotless oilcloth table cover with flies zooming in through an open door to the feast.

751 In fact, in the heat of late Arizona summer and
362 early fall--the serious fly season--the doors of labor
825 camp cabins are closed only when no one is in the cabin. Every breath of air is precious in the oppressive heat. This is true among the Desert People even when they live in excellent concrete block cabins with spacious screened windows and screen doors. They seem to hold a somewhat Steinish concept that a door is a door is a door is a door, whether wood or screen, and they prop open a screen door to let in air just as they would a wooden door.

[659] This all points to the big job the Indian Bureau school and medical service still must do in educating Papago mothers and children to the dangers of the ordinary housefly.

That lack of cabin screening, and Papago lack of knowledge of its necessity is really serious in the labor camps is convincingly shown by other sanitary conditions--or their lack--in these rural slum towns.

TOILET FACILITIES

514 Whatever the construction of houses in their camps,
[466] Pima and Pinal county labor camp operators provide very much the same kind of toilet facilities. In fact, they are almost unanimous in digging a pit and erecting over it the unpainted, rustic outhouse of folklore. Over 95% of the camps in the area exhibit outhouses as alike as boards sawed from the same log.[1] A few long established farmers making a life-time career of their land provided plumbing for their laborers--significant chiefly for proving that it can be done.[2] They had small cotton plantings and hired few pickers.

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[1] Based on: 20 of 21 camps in Pinal county and 22 of 23 in Pima, or 95⅛%.
[2] Basis: 1 of 21 in Pinal and 1 of 23 in Pima county, 4⅛%.

3: Whited G-5 (1890) 1894 NT15 River Yumans
Papago NU28
Pima NU29

Pa 658 797

There is what is termed a "contract school" located at Tucson, which many of the Papago children attend. The school is established and supported in part by a missionary department of the Presbyterian church. The buildings are large, airy, well planned, and adapted to the purpose required. The pupils seem well disciplined and clean. The government pays a stated sum annually to the school for each pupil in attendance as reimbursement for board and clothing furnished. The school owns 5 or 6 good buildings, all in good condition and well furnished, also a farm of 43 acres. On account of lack of water but few garden vegetables are grown, but barley and wheat yield abundantly.

Some of the scholars are taught carpentering, painting, and plastering, and their work is quite satisfactory.

PAPAGOS LIVING OFF THE RESERVATION.

Pa 131 197

These Papago Indians live in the southern part of Pima county, along the southern border of the territory of Arizona. Their language is similar to that spoken by the Pimas. They roam over a country about 100 miles in width north and south and about 125 miles east and west, and there are a few small villages over the Mexican border but near the boundary line.

Pa 13 231

The country in which they live consists of broad, open plains, divided by mountain ranges. The valleys or plains are arid, having no natural springs or running streams of water; yet after the summer rains these plains are covered with grass of a fine quality, and owing to the dryness of the air this grass is cured or dried on the ground and furnishes good, rich food for cattle during the remainder of the year.

Pa 361 312 342 [231]

The Indians select their dwelling places at the foot of the mountains near the mouth of the various canyons that open out into the plains. Small springs often flow through these canyons and sink into the sand. The Indians utilize these springs or sink wells into the sand, and thus secure the underflow from the springs. Their cattle feed out into the plains and return to these wells or springs to drink. Near these watering places, usually on an elevation, the Indians build their houses in their permanent villages of adobe, about 12 by 16 feet in area and about 8 feet in height. Small poles are laid on top and crosswise of the building, and on these are laid brush, with weeds or grass on the brush, the whole covered with about 6 inches of clay, which is impervious to water. The door is of clay, and there is one doorway, but no windows. The doorway is sometimes closed with a dried beef hide. As a rule, they live on the outside of the house. The house contains no furniture except a little bedding and some cooking utensils.

Pa [352]

Pa 262 439 291

Their food consists of beef, dried wild fruit, dried mesquite beans made into a kind of bread, and wild game. During the summer rains they raise some vegetables, which they dry for winter use. They also sell or trade cattle to settlers in the Gila and Santa Cruz valleys for wheat and corn, which the women grind in their crude way into meal and flour. They have adopted the civilized mode of dress, and are gradually learning the use of soap.

The women of the tribe are virtuous and industrious, being in these traits far in advance of any other tribe in the territory.

Po 161 648

There are 4,800 of this tribe living off the Papago reservation. With rare exceptions they are self-sustaining, have always been good citizens, and on many occasions have joined with the whites to assist in suppressing murderous Apaches. The principal occupation of the men is raising cattle and horses, and a little farming when they can find a piece of damp ground that will raise corn and vegetables, hunting, chopping wood around mining camps, and ordinary labor wherever they can find it. If there is any mixed blood in the tribe it is not perceptible.

Pa 46

There are several mining camps scattered throughout the country which these Indians inhabit, and in some of the large valleys wealthy men or companies have sunk wells 500 or 1,000 feet deep and established cattle ranches or ranges, and many Indians are employed about these camps and mines.

Pa 133 497 224

The country is somewhat difficult of access, as there are several mountain ranges running through it. The roads follow the valleys, and sometimes it is "a long way around where it is only a short way across". These mountain ranges abound in game, which the Indians hunt.

Pa 273 231

A month's travel in these Papago villages failed to reveal a single case of drunkenness, although there are frequent instances of drunkenness among Indians in the streets of Tucson. They have great numbers of horses and cattle, but it is impossible to form a correct estimate as to numbers. The horses are small and inferior, but the cattle are fully up to the average in size and quality.

Pa 648 771 197

These Indians as a tribe have always been exceptionally friendly to the white people. They have never received aid from the government. The little religion they have is a conglomerate of Roman catholicism, superstition, and Indian hoodooism. The Roman Catholic church established missions among them more than 150 years ago.

THE RESERVATION AND NONRESERVATION PAPAGO INDIANS, PIMA AGENCY.

Report of Special Agent C. W. Wood on the reservation and nonreservation Papagos of Pima and Cochise counties.

Pa 101 Pi [101] Pa [797]

TRIBAL NAME.—The Papagos and Pimas were formerly one tribe. Authorities differ as to the derivation and meaning of the name. One view is that Papago means "hair cut", another that it means "baptized". Neither of these meanings has any etymological basis or value. The most reasonable derivation of the term seems to be the following, derived from conversation with the oldest Indians: the division of the Pimas occurred from the labors

3: Whited G-5 (1890) 1894 NT15 River Yumans
Papago NV28

133 134 PHYSICAL CHARACTERISTICS OF THE REGION.—The territory covered by the Papagos in their migrations, and in which their villages are located, consists of mountain ranges and the intervening valleys. The soil of the valleys contains a considerable proportion of clay, so that it is all called adobe soil. In the mesas or plains occasional strips of sand occur. Along the arroyos, or dry water channels, deposits of gravel are numerous. The arroyos become raging torrents during the rainy season, rendering travel impossible or dangerous during the temporary flood. The soil of the foothills is very rocky. Alkali is present in the soil in varying proportions, giving the characteristic name to the vast stretch of country known as the alkali desert. It is not the presence of alkali, however, that makes the desert, but the absence of water. An abundant water supply renders this alkali soil equal in fertility to any soil in the country. As it is, the valleys contain a great deal of arable land, which is evident from the great areas covered with grass, which form the stock ranges, and from occasional sections where weeds grow so luxuriantly after the rainy season as to overtop a man on horseback. Some portions of the valleys are covered with mesquite trees and bushes, and also sagebrush, but these sections produce abundant crops when irrigated.

132 CLIMATE.—The climate is very mild, being neither extremely cold in winter nor hot in summer. The mean average temperature during the summer of 1889 was 81.5°, and during the winter of 1889–1890 it was 52.6°.

312 WATER SUPPLY.—There are occasional wells found among the Indian villages. Natural water holes are quite numerous, and by raising embankments of earth in favorable localities the Papagos make huge ponds or reservoirs, which they call tanks. These natural and artificial reservoirs are only serviceable for the temporary storage of water, and toward the last they become filthy mudholes. The Indians, however, continue to use the water as long as it can possibly be considered a fluid. In one place the Papagos have dug a well 80 feet deep, and with incredible labor have made a footpath from the top of the ground to the level of the water.

Water is found by boring at a depth of from 200 to 800 feet, but no flowing wells have yet been obtained in the territory. The water in the wells rises from 50 to 150 feet, and then is raised to the surface by steam pumps. The Indians, however, have not the financial resources with which to sink or operate artesian wells. When their tanks are exhausted they remove with droves and herds to the valleys and canyons in the mountains, frequently crossing over into Mexico.

137 TIMBER.—The varieties of timber within the Papago range are the willow, cottonwood, mesquite, palloverda, and on the southern and western mountain slopes the oak. The mesquite is the most common timber, as it grows freely on the mesas. It rivals the hickory as firewood, throwing out great heat, and the coals retain fire even longer than coals of hickory. The mesquite, however, is very easy to cut, and is handled with far less labor than hickory.

137 FRUITS AND NUTS.—The sahuaro (giant cactus), which grows on the rocky soil of the foothills and covers the moderate mountain ranges, rises in height from 10 to 60 feet, and is a mass of vegetable matter, supported by an internal skeleton of ribs or poles of woody fiber. The fruit of this remarkable plant grows out of the top of the trunk and arms, and constitutes an important article of food, the Papagos almost living upon it during June, July, 272 and a part of August. They gather it with long poles, and eat it either fresh or after it has been dried. They make 262 from the juice a sirup and a drink which is slightly charged with alcohol. Although the ribs of the sahuaro are [273] very valuable, the Indians never destroy the plant, and are greatly incensed if a white man cuts one down; but when the cactus dies and the vegetable matter dries, powders, and falls away, leaving the ribs exposed and bare, [313] they are used as supports for the dirt roofs of adobe houses, for the sides of houses when plastered with mud, for poultry and pigeon houses, and other small structures.

262 The Papagos eat the fruit of the prickly pear cactus and make a sirup from its juice; from the mescal (sweet [273] aloe) a highly intoxicating drink is made. The root, which is bulbous, grows partly under and partly above the ground, and when roasted it is very delicious, and great quantities are consumed by the Papagos. They dig out of the ground a vegetable which appears to be a species of wild onion, but they call it a groundnut, and relish it [388] highly when boiled. A very useful plant found in large quantities, called the soap plant (amole), forms a substitute for soap.

282 The tannin root, resembling the sweet potato in appearance, grows in great profusion. It contains a large portion of tannic acid, and is a substitute for the astringent barks, hemlock and oak, which are used in tanneries.

262 FOOD.—In addition to the fruits, nuts, and flesh already mentioned, their food consists of wheat flour (usually 252 formed by the women on a metáte) prepared in simple ways, parched wheat and corn, boiled wheat and corn, flour made from the mesquite bean, beans, boiled squash, green and dried squash seeds, beef, and poultry.

181 INDUSTRY.—The Papagos seem to be esteemed by the whites in general as the best Indians in the territory. [464] They are industrious, and are good help in mines, on ranches, in the harvest field, and on stock ranges. They easily learn the mechanical arts, and set and handle mining drills as well as white men. The engineer at the Quijotoa mines said that his assistant was a Papago, and that he was fully competent to run the engine.

[312] In practical irrigation the Indians are conceded to be the superiors of the whites, and in their domain this is the foundation of agricultural skill. When properly educated there can be no doubt of their ability to acquire the scientific principles of the art.